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CHANGE OF TITLE

The Colony of the Straits Settlements has ceased to exist. The title of this Bulletin is now therefore changed, but the present issue is a direct continuation of the former Gardens' Bulletin, Straits Settlements, of which the last issue was Vol. XI, part 3, published 30 August 1941.

THE
GARDENS' BULLETIN
SINGAPORE

Vol. XI 30th September, 1947 Part 4

THE SINGAPORE BOTANIC GARDENS DURING 1941-46

Prior to the Japanese attack on Malaya, most of the senior staff of the Gardens were seconded for other duties under the Departments of Food Control and Information, for at least part of the time. The result was that botanical work was reduced, and considerable arrears of unnamed and undistributed specimens accumulated. The Gardens were maintained as usual, with the addition of demonstration plots of vegetables.

After the attack on Malaya, Messrs J. C. Nauen (in charge of the Waterfall Gardens, Penang) and G. H. Addison, horticultural officers, were mobilized with the local defence forces; they were subsequently taken prisoner and sent to work on the Siam-Burma railway, where Mr. Nauen lost his life. An appreciation of Mr. Nauen's services is given elsewhere in this issue. Mr. J. L. Pestana, Laboratory Assistant, was similarly taken prisoner and sent to Siam. Mr. J. W. Ewart, the third senior horticultural officer, was on leave, and was later transferred temporarily to the Dept. of Agriculture, Gold Coast. Mr. M. R. Henderson, Curator of the Herbarium, was evacuated from Singapore with the Dept. of Information, and subsequently worked in the herbarium of the National Botanic Gardens, Kirstenbosch, South Africa. Messrs R. E. Holttum and E. J. H. Corner remained in Singapore during the Japanese occupation; also Dr. C. X. Furtado, Assistant Botanist.

At the time of the Japanese attack on Singapore, fighting ceased on a line about half a mile from the Gardens boundary. Part of the Gardens was occupied by defending troops, and a considerable number of small shells were fired by the Japanese into the Gardens. Most of these exploded in tree-tops, and caused some casualties later among the trees. A few small trees were damaged owing to the digging of trenches and other operations, but on the whole the woody plants of the Gardens suffered little serious damage. The Director's house had a direct hit from a shell, and the Gardens Store was slightly damaged by a

bomb which exploded 20 yards away. The offices and herbarium were undamaged. The local Gardens staff nearly all remained at their quarters, where they had good shelters; three or four of them suffered minor injuries.

Three days after the Japanese occupation, Professor Hidezo Tanakadate, of Tohoku Imperial University, assumed control of the Gardens. He asked Mr. Holttum to remain in executive charge, and to resume all normal horticultural work. The Japanese military required the supply of some ornamental plants, but only such as were easily propagated. Professor Tanakadate and his successors took energetic steps to see that the Gardens were not in any way despoiled by the Japanese military; and the same action was also taken with regard to the Nature Reserves in Singapore Island under the control of the Gardens. Prof. Tanakadate arranged for the Botanic Gardens and Raffles Museum to form a single Department under the Municipality of Singapore, with head office at the Museum. In Sept. 1942 the Marquis Yoshichika Tokugawa assumed the office of Honorary President of the Museum and Gardens; this he held until his departure for Japan in the middle of 1944.

In December 1942 Professor Kwan Koriba, Professor of Botany at the Imperial University of Kyoto, was appointed Director of the Gardens. Thereafter Mr. Holttum ceased to have responsibility for garden work, but unofficially both he and Mr. Corner remained in constant touch with the local staff and advised them in their work. Garden work continued throughout the Japanese occupation, but greatly deteriorated for various reasons. More than half the outdoor staff (49 men) were sent by the Japanese military to work in the Siam-Burma railway; some of those remaining were taken for planting experimental crops of medicinal, fibre and dye plants in the adjoining Tyersall estate, and latterly all spent part of their working time in food production; tools also were gradually reduced both in number and quality. Fortunately the motor mowers were maintained in good running order throughout, so that the grass of the main lawns never got out of hand. Many outlying parts of the Gardens were neglected and became overgrown, and there were considerable losses in some collections of smaller plants. Stocks of pot plants were greatly reduced.

Wages for local staff at the end of the Japanese occupation were less than double the wages of 1941, but prices gradually increased to about 500 times those of 1941, with the exception of a small and diminishing fixed-price ration of rice, sugar and oil. Municipal employees, including those of the Gardens, were at a great disadvantage as

compared with persons employed directly by the Japanese military; but most of the Gardens staff, both indoor and outdoor, remained at their work. Had they not done so, the Gardens could not have been maintained as they were, nor so quickly rehabilitated in 1946. In this connection, special credit is due to Mr. Quan Ah Gun, Chief Clerk, and to Dr. Furtado. Of the men who were sent to work on the Siam-Burma railway, twenty-two lost their lives. These included both Indians and Malays.

Prof. Koriba obtained permission for Messrs. Holttum and Corner to remain in the Gardens and continue their botanical work. Mr. Corner continued his researches on the larger fungi, and also made elaborate investigations of the development of flowers and fruits in various families of trees, from the appearance of the first floral rudiments to ripe fruits and seeds. Mr. Holttum spent most of his time preparing new descriptions of Malay Peninsula representatives of the following groups: Ferns, Orchidaceae, Zingiberaceae, Marantaceae, Gramineae, Cyperaceae.

The Herbarium remained intact (except for the loss of some specimens on loan in Germany) and also the library. All the Japanese scientific officers concerned were insistent that the Herbarium and library (as also the collections at the Raffles Museum) should be preserved as part of the cultural heritage of Malaya, and on this basis the British staff cooperated with them. We should like to express our gratitude to Professor Koriba and others concerned for the disinterested way in which they carried out their duties, and also for much personal courtesy and kindliness. Professor Koriba himself carried out a research into the growth-behaviour of some Malayan trees.

From September 1945 to March 1946, under the British Military Administration, the Gardens were under the care of Dr. Gilbert Archey (Director of the Auckland Museum, New Zealand), who was responsible for Monuments, Fine Arts and Archives. Mr. Holttum left for England on September 18th. Mr. Corner remained in Singapore in immediate charge of the Gardens until November 11th. Mr. J. W. Ewart returned soon afterwards and had charge of the Gardens until the return of Mr. M. R. Henderson in January 1946. Mr. Addison returned to take charge of horticultural work in April 1946, Mr. Ewart being appointed to undertake the duties of Agricultural Officer, Singapore. Mr. Holttum returned to duty as Director in May 1946.

Mr. J. C. NAUEN

John Charles Nauen came to Singapore in July 1935 as an Assistant Curator of the Gardens. He had previously served seven years in Bermuda after completing his training as a Student Gardener at Kew. He remained in Singapore until July 1939, when he was placed in charge of the Waterfall Gardens, Penang. When the Japanese attacked Malaya in December 1941, Mr. Nauen was mobilized as Sergeant in the Penang Volunteer Force, and as such was taken prisoner in Singapore in February 1942. He was subsequently sent to work on the Siam-Burma railway, where he died as a result of blood poisoning in October 1943.

Mr. Nauen was an officer of outstanding ability; and as a man he was held in affection and esteem by all who knew him. He had a very wide knowledge of garden plants and their management, excellent judgment in their use and arrangement, and a great gift in garden design. He devoted much thought to his administrative work and to the welfare and training of those who worked under him. He helped considerably to raise the standard of horticultural work in the Gardens both at Singapore and Penang. He devoted much time and thought to the roadside trees of Singapore. He helped to found a Gardening Society in Singapore, and did good service as its first Secretary. He was the leading spirit in the organization of the Society's Flower Shows, which were a stimulus to professional and amateur growers alike. His alert mind, his sense of humour, his human sympathy, and his integrity of purpose are the characters by which we remember him. His untimely death is a great loss to Malaya.

NEW SPECIES OF VASCULAR PLANTS FROM THE MALAY PENINSULA

By R. E. HOLTTUM

During a survey of the ferns, orchids, grasses and Cyperaceae of the Malay Peninsula, based on all specimens in the Singapore herbarium, a number of undescribed species were found. These are described below. It is hoped that full revised accounts of all these families, as represented in the Malay Peninsula, will be published later. Various changes of names, found necessary during the work, are also here published.

FILICALES

Schizaea paucijuga Holtt., sp. nov.

Rhizoma parvum, apice pilis tenuibus brunneis c. 1½ mm. longis vestitum; *frondes* simplices, c. 8–20 cm. longae, basi teretae, supra basin sensim in laminam angustissimam costatam transientes, haud 1 mm. latae, apice 2–5 lobos fertiles 7–15 mm. longos ferentes; *lobi fertiles* margine glabri, sporangia biseriata pilis brunneis intermixta ferentes.

TYPUS: Kedah Peak, alt. 3000 ped., S.F.N. 1098, leg. Md. Haniff.

This plant has the aspect of a small *S. digitata*, with a distinctly costate but very narrow blade, and the fertile lobes apparently digitately arranged. The lobes are also very like those of *S. digitata* in appearance, but they have only two rows of sporangia and the sporangia are accompanied by hairs as in *S. dichotoma*. It is thus somewhat intermediate between *S. digitata* and *S. dichotoma* (nearer the latter) but has fronds no wider than those of *S. malaccana*. It has the rhizome-hairs of *D. digitata*.

Phymatodes subfasciata Holtt., sp. nov.

Rhizoma breve, c. 2 mm. diametro, frondes confertas ferens; *paleae* haud 3 mm. longae, basi haud 1 mm. latae, margines pilis brevibus paucis instructae, tenues, rufobrunneae. *Stipites* haud basi anguste decurrente frondis distincti, ad summum 2 cm. longi. *Frondes* tenuiter coriaceae, ad 20 cm. longae et 12 latae, oblanceolatae, apice obtusae vel rotundatae, margine manifeste serrulatae, dentes 3–4 mm. dissiti, venae obscurae. *Sori* in seriebus irregularibus 1–4 inter costam et marginem dispositi, sori bini in serie quoque inter venas adjacentes, non immersi, parvi sed interdum contigui; *frondes steriles* fertilibus similes, paucae.

TYPUS: Fraser's Hill, S.F.N. 21559, leg. Holttum.

This species is near *Polypodium subsparsum* Baker (Sumatra) but differs in the much closer hardly stalked fronds, the much more distinctly toothed edges, and smaller sori in more series on larger fronds.

Grammitis crispatula Holtt., sp. nov.

Paleae rhizomatis angustae, acutae, 2 mm. longae, pallide brunneae, integrae. *Stipites* c. 1 cm. longi, pilis rufis confertis patentibus ½ mm. longis vestiti. *Frondes* tenues, 4–10 cm. longae, 6–8 mm. latae, basi abrupte angustatae, apicem versus sensim angustatae, apice obtusae, marginibus omnino crispatulis, utroque latere pilis brevissimis patentibus vestitae. *Venae* unifurcatae, rami inaequales, ramus acroscopicus brevior, cum costa parallelus, ramus basiscopicus longior, patens, marginem non attingens; *sori* ramos acroscopicos venarum occupantes, prope costam, non contigui.

TYPUS: Perak, Maxwell's Hill, 3300 ped. alt., S.F.N. 12705, leg. Burkill, 6 March 1924.

This species is characterized by its short hairs and simple basal vein-branch.

Ctenopteris sparsipilosa Holtt., sp. nov.

Rhizoma breve, erectum, frondes fasciculatas ferens; *paleae* angustae integrae, pallide brunneae, ad 4 mm. longae. *Frondes* brevissime stipitatae, 7–15 cm. longae, 4–7 mm. latae, apicem et basin versus sensim angustatae, dimidio costam versus pinnatifidae, costa pilis brevibus adspersis pallidis (vel rufis ?) instructa; lobi laminae basi 2–2½ mm. lati, obtuse triangulares vel semi-elliptici, integri; *venae* unifurcatae; *sori* in ramis acroscopicis venarum positi, elliptici (receptaculum elongatum), leviter immersi, sporangia nuda.

TYPUS: Gunong Brinchang, alt. 6000 ped., S.F.N. 23522, leg. Holttum.

Near *Polypodium subpinnatifidum* Bl. of Java, Sumatra and Borneo, differing in the absence of spreading hairs on the frond, in broader fronds, with the lower edges of the lobes never revolute, distinctly elongate sori and non-setose sporangia.

Thelypteris herbacea Holtt., sp. nov.

Caudex brevis, erectus. *Stipites* fasciculati, ad 30 cm. longi, tenues, basi excepta pallidi, ex toto capillis mollis pallidis brevibus vestiti; *squamae* breves, angustae, fere nigrae, mox deciduae, raro in frondibus adultis persistentes. *Lamina* fere ad 35 cm. longa et 13 cm. lata, pinnae liberae fere 15-jugatae, inter se distantes c. 2.5 cm., infimae

deflexae sed non reductae; *pinnae maximae* c. 7 cm. longae et 13 mm. latae, acuminatae, sessiles, margine 3/4 ad costam lobatae; *lobi* oblongi, obtusi, integri, 2·5–3 mm. lati; lobus infimus acroscopicus leviter elongatus et interdum ad costam incisus; textura laminae tenuis, herbacea; color in sicco pallide olivaceus; *rachis* straminea, supra dense pilis brevibus, infra pilis patentibus pallidis paucioribus vestitae; *costae* supra pilis crassulis pallidis appressis vestitae, pili similes super venas et margines adspersi; costae infra pilis brevioribus, tenuioribus, patentibus, pallidis vestitae; pili pauci similes venas adspersi; glandulae nullae. *Venulae* in lobis simplicis, 4–5–jugatae, pallidae, utrinque distincte elevatae; sori in medio venarum aut leviter infra medium; indusia reniformia, brunnea, persistentia, pilis rigidis pallidis paucis instructa.

Typus: G. Tahan, S. Reriang, alt. 3000–3500 ped., S.F.N. 20571, leg. Holttum. Also G. Tahan, Wray's Camp, Ridley 16212; G. Padang (Trengganu), 4000 ft., Moysey s.n. 26.6.1937.

This is most nearly related to *Dryopteris pectiniformis* C. Chr. but differs in the scales on the stipe being smaller, darker and not persistent, the pinnae smaller but with broader blunt segments, the surfaces not glandular. It is possible however that *T. herbacea* may exist in two varieties, one with glands and one without, like *D. pectiniformis*. *T. herbacea* differs from *D. viscosa* (J. Sm.) C. Chr. in the pale stipes and rachis, deciduous scales, thinner texture of the lamina and absence of superficial yellow glands.

Cyclosorus ecallosus Holtt., sp. nov.

Caudex brevis repens; *stipites* fasciculati, basin versus squamulis angustis brunneis vestiti, cetera glabri, ad 100 cm. longi. *Lamina* 100 cm. longa et ultra, 45 cm. lata. *Pinnae* multijugatae, sessiles; pinnae infimae 2– vel 3–jugatae haud 2 cm. longae, basi acroscopica valde auriculatae; pinnae subbasales basin versus leviter angustatae, basi acroscopica auriculatae (auriculae magnae, lobatae); pinnae mediales et superiores basi truncatae vel late cuneatae, maximae c. 28 cm. longae et 2·5 cm. latae, apice longe acuminatae, margine dimidio costam versus incisae; *lobi* fere recti, patentes, truncati, apicem versus leviter dentati, basi c. 5 mm. lati; textura laminae tenuis, in sicco subtus verruculosa; rachis et costae supra hirsutae, lamina cetera glabra; *venulae* 7–10–jugatae, subtus pallidae et valde prominentes, infimae solum anastomosantes, vena excurrens recta, ad basin membranae sinus terminata; venulae sub-basales latera membranae attingentes, ceterae ad marginem liberam lobi terminatae; sori inframediales,

in ordinibus duobus cum costulis parallelis; indusia persistentia, integra.

TYPUS: Pahang, Cameron Highlands, alt. 5000 ped., S.F.N. 31294, leg. Holttum. Also same locality, S.F.N. 23427, leg. Holttum. This is closely allied to *C. truncatus* (Poir.) Farw., agreeing in texture and verrucose character of the lamina, in the sori arranged in two parallel rows near the costules, and in pubescence. It differs in having the few lower pinnae prominently auricled on the upper base, with 2 or 3 pairs of greatly reduced pinnae below them, and no small auricles on the stipe, and in having only one pair of veins truly anastomosing, the next pair meeting the sides of the sinus-membrane which is somewhat longer than in *C. truncatus*.

Elaphoglossum peninsulare Holtt., sp. nov.

Rhizoma breve, c. 5 mm. diam.; *paleae* fusco-brunneae, angustae, acuminatae, marginibus irregulariter dentatis vel lobatis. *Stipites* frondium sterilium supra articulationem nulli, infra articulationem 10–15 mm. longi; stipites frondium fertilium 7–15 cm. longi, in juventute dense paleacei. *Frondes steriles* coriaceae, ad 40 cm. longae et 6.5 cm. latae, oblanceolatae, basin versus sensim angustatae, apice obtusae, margine non cartilagineae, infra in juventute paleaceae, paleae costales eis rhizomatis similes sed minores, paleae paginae minutae, stellatae, multiradiatae. *Frondes fertiles* quam sterilibus breviores, 1·7–3·7 cm. latae.

TYPUS: Patani (Lower Siam), Betong, Ban Chanaka, 210–350 m. alt., leg. Eryl Smith 2021, 9 August 1923. Also: Penang Hill 2000 ft., Holttum s.n. 6.1.1937; Richmond Pool, Ridley s.n. 1898. Pahang, Tahan River, Ridley s.n. 1891.

This species grows with *E. melanostictum* (Bl.) Moore on Penang Hill and is rarely fertile. It is easily distinguishable from *E. melanostictum* by its broader fronds, more abruptly narrowed to the bluntly pointed apex, and in its thicker texture. The scales on the lower surface are also more conspicuously stellate, and the fertile fronds very much wider than those of *E. melanostictum* (which are only 1 cm. wide).

Elaphoglossum brevifolium Holtt., sp. nov.

Rhizoma paleaceum ei *E. callifolii* simile; *stipites* frondium sterilium 4–12 cm. longi, frondium fertilium 20–25 cm. longi, infra laminam anguste alati, in juventute paleacei, paleae partim eis rhizomatis similes, partim parvulae irregulares. *Frondes steriles* crasse carnosae, 8–12 cm. longae, 3·5–6 cm. latae, basi anguste cuneatae, apice obtusae, marginibus $\frac{1}{2}$ mm. latis pellucidis, frondes juveniles infra paleis minutis irregulariter stellatis adspersis instructae. *Frondes fertiles* 8–10 cm. longae, 2–3 cm. latae.

TYPUS: Pahang, G. Tahan, alt. 4500 ped., S.F.N. 20750, leg. Holttum, 2 September 1928.

This species has been found on G. Tahan by two other collectors, and a small specimen also on G. Batu Puteh (Main Range, Perak) at 4500–6000 ft. The short broad blunt fleshy fronds with very conspicuous cartilaginous edge, and the very long stipes of the fertile fronds are characteristic.

Bolbitis singaporensis Holtt., sp. nov.

B. quoyanae affinis, differt: pinnis crenatis vel paululo lobatis, basi antice late cuneatis plerumque auriculatis, postice angustioribus, rotundatis; venulis areolas costales et costulares formantibus, areolis ceteris paucis, interdum nullis; costulis maxime 6 mm. dissitis.

Rhizome creeping, the apex bearing thin narrow dull brown scales c. 5 mm. long. *Stipes* close together, green when living, pale when dry, bearing scattered scales throughout, to about 25 cm. long in sterile and 40 cm. in fertile fronds. Lamina of *sterile frond* to about 45 cm. long and 20 cm. wide, pinnae about 12 pairs below the narrowly deltoid lobed pinnatifid apical portion; lowest pinnae slightly shorter than those next above, hardly stalked, subequally cuneate at the base; remaining pinnae to about 13 by 2·5 cm., subtruncate or broadly cuneate and usually slightly auricled on the anterior base, rather narrowly rounded on the posterior side, the margins crenate or shallowly lobed, the crenations or lobes entire except for a single (usually small) tooth often present in the sinuses; texture firm-herbaceous, drying rather dark olivaceous, the smaller veins not clearly raised on either surface; costules 5–6 mm. apart, at about 60° to the costa, straight; veins forming a regular series of costal areoles and usually a few costular areoles, with at most one other series of areoles between those of adjacent costules; in the distal part of some pinnae all veins free except for the costal areoles. *Fertile fronds* with about 10 pairs of pinnae, pinnae to about 6·5 cm. long and 8 mm. wide, the margins entire or crenate, the apex blunt, veins as in the sterile fronds but much closer together, bearing sporangia throughout, the sporangia filling the whole lower surface at maturity.

TYPE: Bukit Timah, Singapore, Hullett s.n., March 1882 (2 sheets).

This is intermediate between *Bolbitis quoyana* and *Egenolfia appendiculata*. It has only been collected in one valley on Bukit Timah, where both these species grow, on granite rocks in the stream bed.

Dryopteris (§ Polystichopsis) **Haniffii** Holtt., sp. nov. **Fig. 1.**

Caudex brevis terrestris. *Stipites* fasciculati, ad 70 cm. longi, dimidio basin versus squamulis angustis integris castaneis vel fuscis, ad 15 mm. longis et 1½ mm. latis dense vestiti, squamae in dimidio superiore breviores, angustiores, fusciores, in frondibus senescentibus plerumque deciduae. *Lamina* ad 55 cm. longa et 40 cm. lata, copiose tripinnata, basi quadripinnata, deltoidea; pinnae infimae maximae, pinnulae earum basiscopicae infimae quam sequentibus haud longiores. *Pinnae infimae* ad 22 cm. longae et 9 cm. latae, pinnulae maximae ad 6 cm. longae et 2 cm. latae, foliolae ordinis tertii ad 2 cm. longae et 6 mm. latae, foliolae ordinis

Fig. 1. **Dryopteris Haniffii: a pinnule and a tertiary leaflet**

quarti, lobique maximi pinnarum superiorum, ad 8 mm. longae et 2 mm. latae; foliolae vel lobi ultimi acuti, apice dentibus 1–3 brevibus rigidis instructae. Textura laminae subcoriacea; color supra in vivo atroviridis, nitens, in sicco atro-olivaceus; rachides, costae, laminaque squamulis angustissimis (plerumque filiformibus) adspersis vestiti. *Venae* in foliolis pinnatae, venulae furcatae (interdum bis furcatae); *sori* in ramulis acroscopicis sedentes, terminales; indusia non visa.

Typus: Pahang, Cameron Highlands, Brinchang, alt. 5000 ped., S.F.N. 31286, leg. Holttum. Also G. Kerbau, alt. 6000 ft., leg. Haniff no. 4038.

This beautiful species is evidently allied to *Aspidium carvifolium* Kze., but differs in its much more finely dissected condition, with very narrow leaflets. It was first collected in 1909 by the late Mohamed Haniff, Overseer of the Waterfall Gardens, Penang, and I name it to perpetuate his memory as a discriminating collector of ferns, and as a keen field botanist from whom I learnt much.

Athyrium angustisquamatum Holtt., sp. nov.

Rhizoma erectum, apice squamis linearibus ad 2 cm. longis haud ½ mm. latis brunneis nitidis leviter undulatis apicem versus dentatis dense vestitum. *Stipites* c. 45 cm. longi, basin versus nigrescentes, apicem versus in vivo virides, basin versus squamulis angustis dense vestiti, supra basin sparse squamati. *Lamina* bipinnata-tripinnatifida, c. 85 cm. longa et 70 cm. lata; pinnae infimae 30 cm. longae, stipitibus 5 cm. longis instructi; pinnae maximae 40 cm. longae et 16 cm. latae, stipitibus 2·5 cm. longis instructi; pinnulae plerumque alternae, pinnulae liberae c. 16-jugatae, infimae leviter reductae, maximae c. 9 cm. longae et 2·4 cm. latae, subsessiles, basi fere aequaliter truncatae (superiores late cuneatae), apice breviter acuminatae, dentatae, margine 4/5 costulam versus lobatae; lobi leviter obliqui, c. 5 mm. lati, apice truncati vel rotundati, subintegri vel leviter crenatoserrati, sinubus angustis separati; rachides, costae, costulae, venaeque subtus squamulis angustis pallidis valde dentatis adspersis instructae, pagina supra glabra; textura laminae herbacea, color in sicco olivaceus; *venae* in lobis ad 7–jugatae, simplices, rarissime furcatae, obliquae; *sori* minuti, ad basin venarum sedentes, rotundati; receptaculum leviter elevatum; indusium non visum.

Typus: Selangor, Ginting Simpak, alt. 2500 ped., S.F.N. 37359 leg. Holttum.

This species has the aspect of a bipinnate species such as *A. latisquamatum* Holtt. or *A. procumbens* Holtt., but

differs most strikingly in the long very narrow medium brown shining scales, and in the very small sori. Only one fertile frond was found, and the sori are rather old.

Taenitis dimorpha Holtt., sp. nov.

Frondes steriles semper simplices, lamina ad 40 cm. longa et 4·5 cm. lata, stipites plerumque 10–20 cm. longi; *frondes fertiles* longe stipitatae, plerumque trifoliatas vel pinnatae, pinnae ad 4–jugatae, plerumque 20–30 cm. longae et 8–10 mm. latae.

TYPUS: G. Muntahak, Johore, alt. 2000 ped., S.F.N. 17399, leg. Holttum.

This species is closely allied to the variable *T. blechnoides*, but the latter always has pinnate sterile fronds on well grown plants, and there is never such a difference in width between fertile and sterile fronds. *T. dimorpha* has been found at several localities in Johore, Malacca, Selangor and Pahang, and seems quite distinct; but it grows in the same places as *T. blechnoides* and the two should be compared in the field.

Vittaria angustissima Holtt., sp. nov.

Rhizoma breve, repens, paleis 2–3 mm. longis integris anguste acuminatis dense vestitum. *Frondes* confertae, 3–9 cm. longae et 1 mm. latae, basin versus sensim angustatae; costa supra leviter caniculata, infra plana; *sori* interdum unilaterales, interdum bilaterales, fere apicem et basin frondis attingentes, submarginales, profunde immersi; cellulae extremae paraphysium obovoideae latitudine longitudine aequales.

TYPUS: Pahang, Fraser's Hill, alt. 4000 ped., leg. C. E. Carr, March 1929. Also same locality, S.F.N. 8835, Burkill & Holttum.

This species is evidently allied to *V. parvula* Bory (*V. lloydiifolia* Racib.) of Java, but is even smaller, and differs in its smaller hair-pointed scales and in the fact that many fronds have sori on one edge of the lamina only. In the fronds which have one sorus only, the non-soriferous half of the lamina is evenly attenuated to the thin margin; where both edges are fertile, the appearance is much as in *V. angustifolia* Bl., the middle area between the sori almost flat on the lower surface, distinctly narrower than the full width of the frond, its edges raised somewhat when the sorus is fully mature with many ripe sporangia.

ORCHIDACEAE

Acriopsis Carrii Holtt., sp. nov.

A. javanica affinis, differt: foliis ad 30 cm. longis et 1 cm. latis; inflorescentia ad 40 cm. longa, ramis pluribus (ad 12), rigide patentibus, brevioribus (5–12 cm. longis); floribus immaculatis; labello albo, gynostemium viride, cucullo brachiaque albescentibus; sepalis petalisque pallide flavescentibus; lamina labelli 3½ mm. longa, basin 1½ mm. lata, supra basin fere ad 1 mm. angustata, apice reflexa, emarginata, carinis 1½ mm. longis.

TYPUS: Gua Musang, Kelantan, 400 ft., leg. C. E. Carr, no. 135.

Also collected at Gua Musang by Henderson, by the Sungei Galas, on *Platycerium Ridleyi* (fern), epiphytic on a Dipterocarpus tree by the river (S.F.N. 22623); also at Bator, Kelantan by Haniff & Nur (S.F.N. 12054).

Anoectochilus duplex Holtt., sp. nov.

Herba c. 10 cm. alta; lamina folii ad 3·5 cm. longa, 2·1 cm. lata, ovata, brevissime acuta, viridis, petiolus cum vagina ad 2 cm. longus; scapus brevissimus; rachis brevis, pubescens, 3–5 flores ferens; bracteae pilis longis adspersis vestitae, ad 11 mm. longae, quam ovarium breviores; *sepalum dorsale* 5 mm. longum, late ovatum, obtusum; *petala* tenuia, sepalo dorsali agglutinata; *sepala lateralia* basi valde concava, basin labelli amplectentia, 9 mm. longa; *labellum* 12 mm. longum, in basi saccata medio carinatum, utrinque glandulis duabus instructum; lobi laterales nulli; unguis angusta, marginibus inflexis contiguis, extus utrinque lamellam dupliciter pectinatam ferens, dentes ordinis primi 4, 2–3 mm. longae, ordinis secundi minores; lamella extrema labelli bilobata, lobi 6½ mm. longi, 4 mm. lati; *gynostemium* 4½ mm. altum, rostello lato incluso, facie inferiore prope stigmata alis duobus parvis triangularibus instructum.

TYPUS: Semangkok Pass, leg. W. S. Napier, February 1904.

Also collected at Fraser's Hill by Burkill & Holttum (F.D. 7803); flowers greenish, blade of lip white. Differs from all other known species of Anoectochilus in the double row of teeth on the flange of the claw of the lip, and also from other Peninsula species in the short upper sepal.

Ascocentrum micranthum (Lindl.) Holtt., comb. nov.

Basinym: *Saccolabium micranthum* Lindl., Gen. et Sp. Orch. 220. 1833.

Synonyms: *Cleisostoma micranthum* King & Pantl., Ann. Calc. 8: 234, pl. 312. 1898.
Saccolabium fissum Ridl., J. Linn. Soc. 32: 361. 1896.

There is a drawing of Ridley's species at Singapore, and I have examined the type specimen. I cannot see that it differs from Pantling's drawing. It does not belong to the genus Cleisostoma (now called Pomatocalpa), having no appendage in the back of the lip. If the flowers were much enlarged, the species would be placed in the genus Vanda. I am not sure that it is properly placed in Ascocentrum, but can find no other genus for it.

Bulbophyllum (§ Micromonanthe) **nigromaculatum** Holtt., sp. nov. **Fig. 2.**

B. tenuifolio Lindl. affinis, differt: pseudobulbis majoribus (1·5 cm. longis) non angulatis; sepalis multo longioribus (9–10 mm. longis), sepalis lateralibus obscure purpureo-striatis, sepalo dorsale venulis 3 viridibus instructo; petalis margine maculis nigris 3 ornatis; labello majore (7 mm. longo), basin versus atropurpureo, basi infra papilloso.

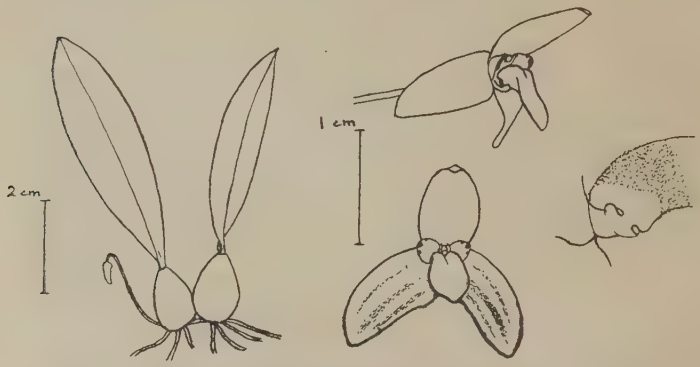

Fig. 2. **Bulbophyllum nigromaculatum:** plant; flower in face and oblique view; base of lip from below.

Pseudobulbs almost touching, ovoid, to 1·5 cm. long, flushed with purple; leaf to 6 by 1·5 cm., hardly stalked, base flushed with purple; scape 2 cm. long, pedicel 3·5 cm.; *sepals* pale green, laterals slightly flushed with purple along the veins, upper with 3 green veins, all 9–10 mm. long, 4½–5 mm. wide, abruptly short-pointed; *petals* 3 mm. long, nearly circular, pale yellow with apical black spot and a smaller one on each side of it; lip bent at right angles close to the base, 7 mm. long, 3 mm. wide, tongue-shaped, base dark purplish with a yellow median groove, apex

yellow with purple spots, lower surface purple, papillose near base; *column* green, anther with arms on each side of it yellow, arms as tall as anther; column-foot flushed with purple, with a free curved end bearing the lip.

TYPE: Cameron Highlands, 4800 ft. alt., leg. Holttum, August 1946.

Calanthe cleistogama Holtt., sp. nov.

Folia ignota; flores non aperti; *sepala* viridi-flavescentia, c. 8 mm. longa, 3½ mm. lata, brevissime mucronata; *petala* similia, flavescentia, leviter breviores; labellum flavum, 9 mm. longum, calcare incluso; calcar 2·5 mm. longum; lamina labelli 4 mm. longa, integra, valde concava, apice marginibus elevatis, 3½ mm. lata, breviter acuta; *gynostemium* album.

TYPUS: Fraser's Hill, leg. C. E. Carr.

The above description is based on flowers in alcohol and colour notes made by the collector. The only other Malayan species of Calanthe with flowers of comparable size is *C. Foerstermannii.*

Calanthe johorensis Holtt., sp. nov.

Folii lamina ad 70 cm. longa, 8 cm. lata, petiolus cum vagina c. 20 cm. longus; scapus c. 80 cm. longus, rachis ad 30 cm., multiflora; bracteae c. 2·5 cm. longae, caducae; pedicellus cum ovario c. 1 cm. longus; *flores* albi; *sepala* 1 cm. longa, 5 mm. lata, breviter acuta, *petala* 4 mm. lata, oblonga, obtusa; calcar labelli 11 mm. longum, rectum, clavatum, angulum 30° cum ovario faciens; lamina labelli trilobata, lobi laterales parvi, auriculiformes, ad basin laminae positi, lobus intermedius oblongus, c. 4½ mm. longus et 2½ mm. latus, basin versus costis 3 haud elevatis instructus, apicem versus reflexus, leviter concavus, apice bilobus, lobi rotundati, ½ mm. longi.

TYPUS: Johore, G. Panti, leg. C. E. Carr, November 1932.

The very long inflorescence of pure white flowers is distinctive among Peninsula species of Calanthe with caducous bracts.

Camarotis adnata (Ridl.) Holtt., comb. nov.

Basinym: *Sarcochilus adnatus* Ridl., J. Linn. Soc. 32: 373. 1896.

Synonym: *Saccolabium adnatum* Ridl., Flora Mal. Pen. 4: 174. 1924.

I have examined the type specimen; it is undoubtedly a Camarotis, and distinct from all other species known to me.

Coelogyne (§ Longifoliae) **stipitibulbum** Holtt., sp. nov.

Pseudobulbi 2–3 cm. dissiti, ad 6 cm. longi, 2¼ cm. lati, basi stipitiformes, supra medium dilatati, obtuse 4-angulati, demum longitudinaliter corrugati; *folia* 2, ad 15 cm. longa et 3 cm. lata, basi in petiolum 2 cm. longum angustata, margine crispata; scapus 6–10 cm. longus, compressus, 2–2½ mm. latus, rachis demum 30 cm. vel ultra longa, internodia c. 10 mm. longa, bracteae 2·5–2·8 cm. longae; *flores* omnino pallide salmonei; *sepalum dorsale* 2·6–2·9 cm. longum, 10 mm. latum; *petala* 2 mm. lata; labellum 2·3 cm. longum, lobi laterales erecti, antice breviter rotundati, quam lobo intermedio multo breviores, lobus intermedius 1·5 cm. longus, 8 mm. latus, leviter convexus, anguste elllipticus, apice acutus, carinis duabus levibus humilibus usque ad dimidium lobi extensis instructus; *gynostemium* quam lobis lateralibus labelli brevius, apice late alatum, truncatum.

TYPE: Cameron Highlands, S.F.N. 23284, leg. Holttum & Henderson.

This species is closely allied to *C. carnea*, but differs in stalked pseudobulbs thickened in the upper half, larger flowers with differently shaped midlobe and proportionately shorter sidelobes and column.

Corybas caudatus Holtt., sp. nov.

Folia cordata, acuta, c. 18 mm. longa et 12 mm. lata, pallide viridia, margine non crispata; flos c. 2 cm. alta, ovario 4 mm. longo incluso; *sepalum dorsale* album, rubrostriatum, basi erectum, 3 mm. latum, apicem versus horizontale, leviter cucullatum, 7 mm. latum, apice rotundatum, in caudam 3–4 mm. longam abrupte productum, margine prope caudam leviter irregulariter dentatum; *sepala lateralia* petalaque rubra, basin versus alba, 3–3·5 cm. longa; *labellum* album, rubrostriatum, basi erectum, marginibus cucullum sepali dorsalis fere attingens, medio abrupte recurvum, margine alba fimbriata fere circulum formante, 15 mm. latum, fimbriae ad 2½ mm. longae; calcaria 4 mm. longa, supra rubra.

TYPUS: G. Tahan, leg. E. J. H. Corner, 1937.

This species is similar to *C. pictus* in its long lateral sepals and petal, but differs in (1) leaf not crisped, (2) caudate apex of dorsal sepal, (3) longer fringe on the lip.

Cystopus macranthus (Hk. fil.) Holtt., comb. nov.

Basinym: *Odontochilus macranthus* Hk. f., F.B.I. **6**: 98. 1890. Ic. Pl., t. 2161.

Synonym: *Anoectochilus macranthus* Ridl., Mat. Fl. M.P. **1**: 215. 1907.

As pointed out by Ridley, this species is a true Cystopus, which genus is maintained by J. J. Smith, being distinguished from Anoectochilus by having the two stigmas united. *C. macranthus* differs from most species of Cystopus by lacking a toothed flange on either side of the claw of the lip.

Cystorchis gracilis (Hk. f.) Holtt., comb. nov.

Basinym: *Goodyera gracilis* Hk. f., F.B.I. **6**: 112. 1890. Ic. Pl. t. 2183.

In typical Cystorchis the spur of the lip has a vesicle on each side at the base, each vesicle containing a gland. In *C. gracilis*, the spur is not elongated beyond the vesicles, which coalesce, giving a saccate structure containing two glands, as in *C. aberrans* J.J.S. (Bull. Buitenz. Ser. 3, **5**: 22. 1922), which may be conspecific with *C. gracilis*. Otherwise the flowers are like Cystorchis, not like Goodyera, which has hairs in the base of the lip.

Dendrobium (§ Calcarifera) **brinchangensis** Holtt., sp. nov. **Fig. 3.**

Pseudobulbi ad 70 cm. longi, internodia 2–2½ cm. longa; folia maxima 13 cm. longa, prope basin 16 mm. lata, apicem versus sensim angustata, vaginae purpureo-suffusae; inflorescentiae flores 1–3 ferentes; *flores* pallide lilacini, labello maculo flavo medio ornato; *sepalum dorsale* 12 mm. longum, 6 mm. latum; mentum 12 mm. longum, fere rectum; *petala* 12 mm. longa, 4½ mm. lata, acuta; labellum cum apice pedis gynostemii junctum, calcar 5 mm. longum faciens, pars libera labelli 17 mm. longa, fere plana, lamina quam ungue paullo latior, 4½ mm. lata, apice abrupte angustata, obtusa, basi carinis 2 humilibus V-forme convenientibus instructa, conjunctio carinarum leviter elongata, libera, in ore calcaris posita.

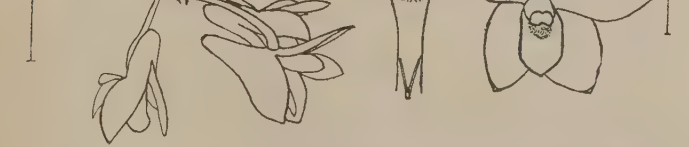

Fig. 3. **Dendrobium brinchangensis**: end of pseudobulb with one inflorescence; upper surface of free part of labellum; flower in face view.

TYPE: G. Brinchang, Cameron Highlands, S.F.N. 23533, leg. Holttum.

Allied to *D. cornutum* Hk. f. but differing in colour, in the equal length of upper sepal and mentum, the nearly flat lip with abrupt apex and longer closed spur. Found on three occasions on G. Brinchang, where it is common at 5500–6000 ft., flowering in April, August and December.

Dendrobium (§ Conostalix) **melanochlamys** Holtt., nom. nov.

D. villosulum Wall. apud. Hk. f., F.B.I. 5: 728. 1890. (Not *D. villosulum* Lindl. 1852).

Dendrochilum Blume.

It is now usual to unite Platyclinis with this genus. Some of Ridley's species of Platyclinis have not yet been transferred to Dendrochilum: the necessary new combinations are proposed below.

Dendrochilum carnosum (Ridl.) Holtt., comb. nov.

Basinym: *Platyclinis carnosa* Ridl., Journ. F.M.S. Mus. **6**: 56. 1915.

Dendrochilum gramineum (Ridl.) Holtt., comb. nov.

Basinym: *Platyclinis graminea* Ridl., Journ. F.M.S. Mus. **6**: 57. 1915.

Dendrochilum lineare (Ridl.) Holtt., comb. nov.

Basinym: *Platyclinis linearis* Ridl., J. Linn. Soc. **32**: 230. 1896.

Eria (§ Hymeneria) **clavata** Holtt., sp. nov.

Pseudobulbi c. 4 cm. longi, 1 cm. diam., 2–foliati; folia c. 7 cm. longa, 1·4 cm. lata; inflorescentia erecta, 4 cm. longa, flores 8 ferens; bracteae pallide virides, 8 mm. longae, 4 mm. latae; sepala petalaque alba, apice pallide rubra; *sepalum dorsale* 8 mm. longum, 3½ mm. latum; *sepala lateralia* cum pede gynostemii mentum 4 mm. longum formantia, mentum angulum 60° cum ovario faciens; *labellum* trilobatum, pallide rubrum, lobis lateralibus carinisque atropurpureis, latere visum e basi ad apicem curvatum, carinis 3 basin versus donatum, carina media in lobum intermedium producta, in callo parvo semiorbiculare terminata; lobus intermedius apice recurvus, leviter emarginatus, medio carnosus, papillosus, parte carnosa basin versus ampliata, ad basin labelli producta.

TYPUS: Fraser's Hill, leg. C. E. Carr, 1929.

In habit this species resembles *E. Maingayi*, but differs in broader leaves and different colour and shape of flowers.

Habenaria sumatrana Schltr., var. **major** Holtt., var. nov.

A speciei typica differt: floribus majoribus; sepalis petalisque 7–8 mm. longis; labello 12 mm. longo, basi viride 6 mm. longa et 3 mm. lata, lamella alba abrupte ampliata, 12 mm. lata, 3–lobata, lobis lateralibus angulo 60° patentibus, rhomboideis, 4 mm. latis, margine leviter dentatis, lobo intermedio obtuso, 2 mm. longo, 1 mm. lato, calcare 3 mm. longo.

This variety is rather common in open places in Kedah. It should perhaps rank as a separate species; but further information about the variation of *H. sumatrana* is needed before this can be decided. The form of *H. sumatrana* described from Java by J. J. Smith seems to be larger than that common in Malaya, and perhaps comes between the latter and var. *major*.

Kuhlhasseltia Carrii Holtt., sp. nov.

Planta florens c. 18 cm. alta; lamina folii c. 4 cm. longa, 14 mm. lata, elliptica, acuta, petiolus cum vagina 16 mm. longus; scapus 11 cm. longus, breviter pubescens, bracteas steriles 3, ad 4 cm. longas, ferens; rachis brevis, flores 3 ferens; bracteae ad 9 mm. longae, marginibus hirsutis, cetera glabrae; ovarium c. 10 mm. longum, pubescens; *sepalum dorsale* 8 mm. longum, glabrum; *sepala lateralia* basin labelli amplectentia; *petala* angusta, sepalo dorsali agglutinata; labellum 8 mm. longum, basi saccata 15 mm. alta, lamella bilobata, lobi patentes, 2½ mm. longi, 13 mm. lati.

TYPUS: Fraser's Hill, leg. C. E. Carr, November 1930.

This has larger flowers than the other species of the genus, and much larger leaves.

Liparis (§ Platystylis) **hirundo** Holtt., sp. nov. Fig. 4.

Pseudobulbi ovoidei, c. 6 mm. alti, 2–foliati; folii lamina ad 2 cm. longa, 5 mm. lata, elliptica, acuta, petiolus cum vagina infra articulum ad 6 mm. longus; inflorescentia ad 7 cm. longa, tenuissima, scapus brevis, anguste alatus; rachis anguste alata, flores c. 5 mm. dissiti, bracteae 2–3 mm. longae; pedicellus cum ovario 5–6 mm. longus; *sepala* 3½ mm. longa, marginibus revolutis; *sepala lateralia* post labellum adjacentia, pro parte adjuncta; *petala* angustissima haud 2½ mm. longa, reflexa; labellum 2½ mm. longum, basi ad gynostemium adpressum, carnosum, antice excavatum, cetera angulum 90° cum gynostemio faciens, prope basin abrupte ampliatum, fere oblongum, angulis basalibus leviter productis et recurvis, apice brevissime

acutum; *gynostemium* 2½ mm. longum, curvatum, utroque latere alatum, prope stigma alis duabus angustis 1½ mm. longis reflexis, antice infra apicem alis duabus brevibus late triangularibus donatum.

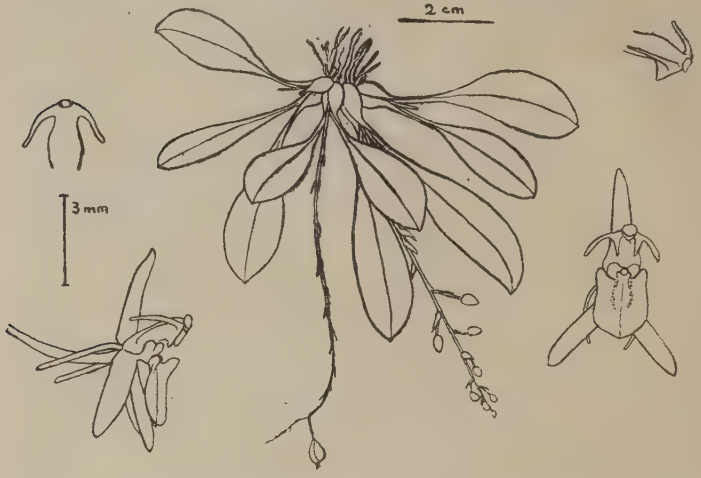

Fig. 4. **Liparis hirundo:** plant in natural position; flower in front and side view; column from back and side.

TYPUS: Cameron Highlands, leg. Batten-Pooll, 1939–40.

This species is related to *L. decurrens* and a few others of Java, Sumatra and the eastern Himalayas, but none of them are so small, and none have the long wings on each side of the stigma. These wings are spreading and curved backwards, and in that position have the shape of a swallow's wings in flight, the anther representing the head of the bird and the front column-wings its breast. The flowers are a pale salmon-pink, the lip deeper in colour than the rest. The leaves are pale green, and the plants hang from the branches of trees beside small forest streams in sheltered places.

Malaxis Soland.

It is now usual to include Microstylis Nutt. in Malaxis. Some species of the Peninsula need transferring to the latter genus, and the new names are proposed below.

Malaxis macrochila (Rolfe) Holtt., comb. nov.

Basinym: *Microstylis macrochila* Rolfe, Kew Bull. **1895**: 6.

Malaxis nemoralis (Ridl.) Holtt., comb. nov.

Basinym: *Microstylis nemoralis* Ridl., J. Str. Br. R.As. Soc. 54: 47. 1910.

Malaxis perakensis (Ridl.) Holtt., comb. nov.

Basinym: *Microstylis perakensis* Ridl., J. Linn. Soc. 32: 222. 1896.

Malaxis reniloba (Carr) Holtt., comb. nov.

Basinym: *Microstylis reniloba* Carr, Gard. Bull. S.S. 7: 5. 1932.

Malaxis stenophylla Holtt., sp. nov.

Pseudobulbi c. 1 cm. alti, folia c. 6 ferentes; *folia* maxima 6 cm. longa et 6 mm. lata, apicem versus angustatus, marginibus leviter crispata, basi vaginata, vagina 10 mm. longa; inflorescentia ad 12 cm. alta, tenuis, scapus ad 5 cm. longus; flores 3–5 mm. dissiti, simul aperti, pauci; bracteae 3½ mm. longae, pedicelli cum ovariis 4–5 mm. longi; *sepala* 2 mm. longa, lata; *petala* valde angustiora; *labellum* totum 2½ mm. longum, fere 2½ mm. latum, 3-lobatum, lobi magnitudine fere aequales; lobi laterales elliptici, obliqui, post gynostemium in auriculis rotundatis brevibus producti; lobus intermedius cordatus, apice breviter bidentatus, dentes leviter incurvi, sinus rotundatus; *gynostemium* breve, alis brevibus donatum.

Typus: Trengganu, G. Padang, alt. 4000 ft., S.F.N. 33932, leg. Moysey.

This species is probably nearest to *M. calophylla*, but has very narrow leaves, and a distinctly trilobed lip. The shape of the side-lobes is nearly as in *M. reniloba* (Carr), but the whole lip is much smaller in *M. stenophylla* and the midlobe proportionately much larger than in *M. reniloba*. No colours of the flowers were recorded.

Malleola altocarinata Holtt., sp. nov.

Caulis brevis, pendulus; *folia* pauca, c. 8 cm. longa, 2·5 cm. lata, oblanceolata, apice obtusa inaequaliter bilobulata; inflorescentia c. 10 cm. longa, pendula, multiflora; flores 8 mm. longi; *sepalum dorsale* supra gynostemium cucullatum, c. 4 mm. longum, 2½ mm. latum; *sepala lateralia* patentia, 4 mm. longa, 2½ mm. lata; *petala* 3½ mm. longa, haud 2 mm. lata, acuta; labellum ovarium versus reflexum; lobi laterales carnosi, humiles, rotundati, leviter patentes; lobus intermedius anguste triangularis, carnosus, apice reflexus, 2 mm. longus, basi alto-carinatus, carina supra ostium calcaris elevata, basi utroque latere ad lobos laterales juncta; calcar sub ostio primo late cylindricum,

3 mm. longum et 2 mm. latum, demum constrictum, apice fere globosum, 1 mm. diam., intus postice callo parvo instructum; *gynostemium* 1½ mm. altum.

TYPUS: Ginting Simpah, Selangor, leg. Mungo Park, October 1932.

This is allied to *M. aberrans* from Celebes and *M. baliensis* from Bali and Java; all agree in having a high keel at the base of the midlobe of the lip.

Malleola macranthera (Ridl.) Holtt., comb. nov.

Basinym: *Saccolabium macrantherum* Ridl., Kew Bull. 1926: 478.

Synonym: *Abdominea macranthera* Carr, Gard. Bull. S.S. 7: 54, pl. 5B. 1932.

I think Carr was mistaken in including this species in Abdominea. The large rostellum of *Abdominea minimiflora* (Hk. f.) J.J.S. has a narrow base and is quite different in shape from that of *Saccolabium macrantherum* Ridl. Abdominea also has four pollinia, and a lip of quite different shape. The column and spur of *S. macrantherum* agree quite well in shape with species of Malleola, and the stipes of the pollinia also.

Oberonia calcicola Holtt., sp. nov.

Caules brevissimi, folia c. 6 ferentes; *folia* flabelliforme patentia, maxima 5·5 cm. longa, 9 mm. lata, fere recta, e basi lata sensim angustata, apice breviter acuta; inflorescentia c. 10 cm. longa, erecta vel apice nutans, scapus c. 1 cm. longus; *flores* in verticillis c. 6–floribus dispositi, verticilli 2 mm. dissiti; bracteae 2 mm. longae, fere integrae; sepala petalaque integra; *sepala* reflexa, late ovata, lateralia quam dorsale latiora; *petala* anguste oblonga; labellum petalis aequilongum, basi carnosum, 3–lobatum; lobi laterales parvi, breves, fere quadrangulares, integri; lobus intermedius oblongus, e basi paullo ampliatus, apice bilobatus, lobuli angusti, acuti, breves, sinus latus.

TYPUS: Langkawi, S.F.N. 21398, leg. Henderson. The flower on the only specimen is old and the details of the lip uncertain.

Oberonia flabellifera Holtt., sp. nov.

Caules ad 2·5 cm. longi, leviter sinuati, 3–5–foliati; *folia* angulum infra 45° cum caule facientia, supra basin vaginata c. 1·5 cm. longa, 2½ mm. lata, oblonga, breviter acuta; inflorescentia ad 7 cm. longa, scapus 10 mm.; *flores* in verticillis c. 7–floribus dispositi, verticilli 3–4 mm. dissiti; bracteae breves, latae, margine minute papillosae; pedicellus cum ovario 1 mm. paullo superans; sepala petalaque pallide flavescentia, omnia patentia, aequilonga, flos totus 1½ mm.

latus; *sepala* late ovata, fere aequalia, integra, sepalum dorsale obtusum, lateralia acuta; *petala* quam dimidium sepali paullo latiora, obovata, margine irregulariter dentata; labellum ochraceum, petalis aequilongum, circumscriptione fere semiorbiculare, 3–lobatum; lobus intermedius angustus, apicem versus ampliatus, apice plus minusve emarginatus; lobi laterales flabelliformes, profunde incisi, dentes basin labelli versus decrescentes.

TYPUS: Johore, Mawai, S.F.N. 28162, leg. E. J. H. Corner.

Also found on old mangrove in Singapore. The side-lobes of the lip almost meet the midlobe, which is not very distinct; otherwise the lip is very like that of *O. stenophylla*, but the leaves are very short and the apices of the sepals not deflexed.

Oberonia transversiloba Holtt., sp. nov.

Caules c. 4·5 cm. longi, c. 6–foliati; *folia* cum caule angulum parvum facientia, fere recta, apicem versus leviter incurva, acuta, prope basin valde articulata, supra articulum c. 9·5 cm. longa, 5 mm. lata; inflorescentia erecta, ad 16 cm. longa, scapus 6 cm.; *flores* in verticillis c. 6–floribus dispositi, verticilli 2½–3 mm. dissiti; bracteae integrae; pedicellus cum ovario 2 mm. longus; sepalum dorsale petalaque patentia, integra, fere aequalia; petala tamen apice angustiora; sepala lateralia latiora, reflexa; labellum aurantiaco-flavum, 3–lobatum, petalis aequilongum, fascia humile e basi fere ad apicem donatum; lobi laterales parvi, rotundati; lobus intermedius transverse oblongus, marginibus leviter et irregulariter dentatis.

TYPUS: Pahang, Gua Tipus, S.F.N. 19448, leg. M. R. Henderson.

Octarrhena condensata (Ridl.) Holtt., comb. nov.

Oberonia condensata Ridl., Journ. Linn. Soc. **38**: 322. 1908.

I have collected fresh specimens of this species at Cameron Highlands and compared them with the type. This species is much larger than *Octarrhena parvula*, with stems to 20 cm. long, leaves to 3·5 cm. long and 5 mm. wide, much flattened laterally, and crowded flowers of a deeper yellow colour.

Pennilabium acuminatum (Ridl.) Holtt. comb. nov.

Basinym: *Sarcochilus acuminatus* Ridl., Journ. F.M.S. Mus. **4**: 72. 1909.

I have examined the type of this species; it is certainly a Pennilabium.

Phaius longipes (Hk. f.) Holtt., comb. nov.

Basinym: *Calanthe longipes* Hk. f., F.B.I. **6**: 195. 1890.

Oldest name: *C. gracilis* Lindl., Gen. et Sp. Orch 251. 1833. (Not *Phaius gracilis* Hayata 1911).

Though aberrant in the genus Phaius, this species, with column and lip not joined together, appears to me better placed in Phaius than in Calanthe.

Phaius pauciflorus Bl., Mus. Bot. 2: 181. 1852. (Limatodis Bl. 1825), var. **pallidus** (Ridl.) Holtt., stat. nov.

Basinym: *Phaius pallidus* Ridl., Journ. Linn. Soc. **32**: 313. 1896.

Synonym: *Limatodis pallidus* Ridl., Fl. Mal. Penin. **4**: 124. 1924.

Three varieties of *P. pauciflorus* have been described in Java and Sumatra (*see* J.J.S. in Fed. Rep. 32: 238 for synonymy). The Malay Peninsula plants appear to me to come within the range of the species so interpreted, but are slightly different from **var.** *sumatranus*.

Phalaenopsis decumbens (Griff.) Holtt., comb. nov.

Basinym: *Aerides decumbens* Griff., Notul. **3**: 365. 1851. Ic. t. 320.

Synonyms: *Kingiella decumbens* Rolfe, Orch. Rev. **25**: 197. 1917. Ridl., Flora 4: 158.

Phalaenopsis wightii Rchb. f., Bot. Zeit. **1862**: 214.

Doritis wightii Benth., Gen. Plant. **3**: 574. 1883. King & Pantl., Ann. Calc. **8**: 198, t. 265.

Phalaenopsis hebe Rchb. f., Hamb. Gartenz. **18**: 35. 1862. J.J.S., Fl. Buit. **6**: 550, fig. 417.

I can see no clear distinction between Pantling's illustration of *Doritis wightii* and J. J. Smith's of *Phalaenopsis hebe*. I agree with J. J. Smith in referring this species to Phalaenopsis, and it appears that Griffith's is the oldest name.

Pholidota longibulba Holtt., sp. nov.

Pseudobulbi 1–2 cm. dissiti, 7–9 cm. longi, prope basin 15–20 mm. lati, apicem versus sensim attenuati, valde angulati, laeves, unifoliati. Lamina folii ad 30 cm. longa et 5·5 cm. lata, oblanceolata, apice breve acuminata, venae primariae 5, petiolus 2½–4 cm. longus. Inflorescentia cum folio immaturo in apice pseudobulbi immaturi explicata; scapus tandem 18 cm. longus, haud 1 mm. diametro, erectus; rachis ad 18 cm. longa, nutans, flexuosa, internodia c. 4 mm. longa; bracteae deciduae, 9 mm. longae, 5 mm. latae, ellipticae, apice rotundatae; pedicelli nulli, ovarium 2½ mm. longum. *Sepalum dorsale* 4½ mm. longum, 3½ mm. latum, ovatum, apice rotundatum, concavum; *sepala lateralia* 5 mm.

longa, valde carinata, concava. *Petala* 3½ mm. longa, 2 mm. lata, ovata, acuta. Saccus labelli 3½ mm. longus, 2½ mm. latus, intus 3–venulosus, venulis non carinatis, antice lobum unicum ferens; lobus recurvatus, explicatus reniformis, 3½ mm. latus, 2 mm. longus, basi callo leviter bilobo cum sacco junctus. *Gynostemium* 2 mm. longum, 1½ mm. latum; rostellum fere erectum; alae laterales angustae, lobo parvo triangulo prope stigma instructae; ala apicalis brevis, truncata; anthera fere horizontalis, explicata 1·7 mm. lata, 1·3 mm. longa.

TYPUS: Pahang, Cameron Highlands, 4800 ped. alt., leg. Holttum, Aug. 1946.

Pomatocalpa setulense (Ridl.) Holtt., comb. nov.

Basinym: *Saccolabium setulense* Ridl., J.S.B.R.A.S. **59**: 198. 1911.

I have examined the type of this species; it is a Pomatocalpa, as defined by J. J. Smith.

Rhynchostylis gigantea (Lindl.) Ridl., var. **Harrisoniana** (Hk.) Holtt.

Basinym: *Saccolabium Harrisonianum* Hk., Bot. Mag. t. 5433. 1864.

It appears to me that Hooker's species is no more than a colour variety of *R. gigantea*.

Sarcanthus capricornis (Ridl.) Holtt., comb. nov.

Basinym: *Ascochilus capricornis* Ridl., Flora Mal. Penin. **4**: 181. 1924.

I have examined the type of this species at Kew. It is undoubtedly a Sarcanthus, and appears to be distinct from any other species already described, though very near to the Siamese *S. recurvus* Downie, which has a larger inflorescence and smaller flowers. The following is a revised description.

Stems to about 15 cm. long, internodes about 5 mm. long; leaves 2½–4 cm. long, terete, strongly recurved, acute, about 3 mm. thick; inflorescences about 6 cm. long including the scape of barely 1 cm.; bracts 1 mm. long, 3 mm. apart; pedicel and ovary 8 mm. long; *upper sepal* nearly 4 mm. long; *petals* about 3 by 1½ mm.; lip with saccate non-septate spur 1½ mm. long and wide, erect broadly rounded side-lobes 2 mm. long and wide, narrowly triangular mid-lobe 3 mm. long and 2 mm. wide, with short hairs at the entrance to the spur, and a thick bluntly triangular back-callus; column–foot about 2 mm. long. "Upper petal (*i.e.*, sepal) magenta, lower petals brownish green mottled with red" (collector's note).

Sarcanthus inflexilobus Holtt., sp. nov.

Caulis 5 cm. longus, c. 10–foliatus; *folia* ad 16 cm. longa et 1 cm. lata, carnosa, apice sensim angustata, bilobulata, obtusa, infra valde carinata; inflorescentia simplex vel ramulis 1–2 instructa, ad 15 cm. longa; scapus 5 cm. longus; *sepalum dorsale* 3 mm. longum, 1½ mm. latum, obtusum; *petala* 2½ mm. longa, haud 1 mm. lata; labellum ex apice calcaris ad apicem lobi intermedii 6 mm. longum; calcar anguste conicum, 3 mm. longum, prope apicem solum longitudinaliter septatum; lobi laterales horizontaliter inflexi, in medio ostii calcaris fere congredientes; callus ad basin gynostemii T–formis (antice visus), capite supra ostium calcaris elevato, basi in lacunam inter lobos laterales descendens; lobus intermedius concavus, non callosus, sagittatus, 2½ mm. longus et latus, lobulis basalibus angustatis, acutis, elevatis, apice obtusa leviter reflexa.

TYPUS: Gua Musang, Kelantan, August 1929, leg. C. E. Carr.

Sarcanthus ionosmus (Ridl.) Holtt., comb. nov.

Basinym: *Cleisostoma ionosmum* Ridl., Journ. Linn. Soc. 32: 336. 1896 (not of Lindley).

Synonym: *Saccolabium ionosmum* Ridl., Mat. Fl. Mal. Penin. 1: 170. 1907.

I have examined the type of this species.

Sarcanthus lanatus (Lindl.) Holtt., comb. nov.

Basinym: *Cleisostoma lanatum* Lindl., Journ. Hort. Soc. 4: 164. 1849.

Synonym: *Sarcanthus bracteatus* Ridl., J. Linn. Soc. 32: 370. 1896.

I have examined the type of Ridley's species, and find it to agree with *Saccolabium lanatum* Hk. fil., as figured in Ann. Calc. 5, t. 72. It is peculiar in its hairiness, but seems to be a true Sarcanthus in flower-structure.

Sarcanthus rugulosus (Ridl.) Holtt., comb. nov.

Basinym: *Saccolabium rugulosum* Ridl., J.S.B.R.A.S. 39: 82. 1903.

I have examined the type of this species.

Sarcochilus carrii Holtt., sp. nov.

S. siamensis sensu Carr, Gard. Bull. S.S. 5: 31, pl. XI, B (1929), non *Ascochilus siamensis* Ridl., Journ. Linn. Soc. 32: 375. 1896.

Caules brevissimi, c. 5–foliati; *folia* ad 4 cm. longa, 12 mm. lata; scapus tenuis, minute asperus, erectus, quam folia brevior; rachis brevis, bracteae brevissimae; flores pallide flavescentes, labellum album; *sepala* c. 3½ mm. longa, lateralia 2 mm. lata, dorsale angustius; *petala* 3 mm. longa, haud 1 mm. lata; labellum ecalcaratum, dorso lineam

pedis gynostemii continuans, 3 mm. longum; lobi laterales oblique erecti, obovati, apice rotundati, postice 2½ mm. longi, 1·2 mm. lati; lobus intermedius valde carnosus, antice visus oblongus, breviter acutus, sectione longitudinale triangularis; *gynostemium* c. 1·2 mm. longum; pes gynostemii aequilongum, cum gynostemio angulum 90° faciens.

TYPUS: Mentakab, Pahang, leg. C. E. Carr.

This species resembles the true *S. siamensis* (Ridl.) Carr in general appearance and colouring, but has no spur. Carr correctly showed that the two species were distinct and figured them both; but he evidently did not carefully examine the type of *Ascochilus siamensis*, which agrees with the specimen he named *S. mentakabensis*. The specimen figured by him as *S. siamensis* therefore needs a new name and diagnosis.

Sarcochilus johorensis Holtt., sp. nov.

Caulis brevis, c. 5–foliatus; *folia* ad 8 cm. longa, 15 mm. lata, obtusa; scapus 3 cm. longus, asperulus; rachis 1 cm. vel ultra longa, incrassata; flores conferti; bracteae 2 mm. longae, latae, obtusae; pedicellus cum ovario c. 8 mm. longus; sepala petalaque pallide sordide flavescentia; sepala extus breviter hirsuta; *sepalum dorsale* 11 mm. longum 5 mm. latum, obovatum, acutum; *sepala lateralia* brevissime ad pedem gynostemii juncta; *petala* 10 mm. longa, 3½ mm. lata; labellum 7·7 mm. longum, fere lineam pedis gynostemii continuans (calcar leviter inflexum); lobi laterales sordide rufobrunnei, erecti, rotundati, apicem versus ampliati, 2½ mm. lati; lobus intermedius carnosus, supra calcar sedens, 2½ mm. longus, 2 mm. altus, lateraliter compressus, apicem versus elevatus, antice angulum 90° cum calcare faciens; calcar quam lobus intermedius 3 mm. longius, rectum, cylindricum, 2 mm. diam., gynostemium 6½ mm. longum; pes gynostemii 5 mm. longum.

TYPUS: Johore, Sedili River, leg. C. E. Carr, October 1932.

Sarcochilus minutiflorus (Ridl.) Holtt., comb. nov.

Basinym: *Ascochilus minutiflorus* Ridl., J.S.B.R.A.S. 39: 85. 1903.

Ridley's Ascochilus is not very sharply differentiated from Sarcochilus and I prefer to unite it with Sarcochilus.

Thrixspermum scopa (Hk. fil.) Holtt., comb. nov.

Basinym: *Sarcochilus scopa* Hk. fil., F.B.I. **6**: 40. 1890.

(*Thrixspermum arachnites* quoad Ridl., Flora M.P. **4**: 185, p.p.).

This species appears to be distinct from *T. arachnites* (Bl.) Rchb. f. in its much longer stems (internodes 2·5 to

5 cm. long, as compared with 1 cm. in *T. arachnites*), but is very similar in its flowers. The two need to be cultivated side by side and critically compared.

Thrixspermum (§ Dendrocolla) **duplocallosum** Holtt., sp. nov. **Fig. 5.**

Caulis c. 4 cm. longus, paucifoliatus, internodia 4 mm. longa; *folia* c. 6 cm. longa, 11 mm. lata, non carnosa, apice bilobata, subtus purpurea; scapus purpureus, 4·5 cm. longus, rachis 8 mm. longa, bracteae 2 mm. longae, late triangulares, purpurascentes; pedicellus cum ovario 5 mm. longus; sepala petalaque alba, leviter roseo-tincta; *sepalum dorsale* 6½ mm. longum, 3¼ mm. latum, *sepala lateralia* 4 mm. lata; petala 2¼ mm. lata; labellum *petalis* sepalisque aequilongum, glabrum, aurantiacum, callis duobus sordide sanguineis instructus, lobi laterales erecti, 2½ mm. alti, rotundati, antice non prominentes, lobus intermedius 2¼ mm. latus, semiorbicularis, reflexus, margine dentatus, callus anticus basi lobi intermedii positus, latus, medio depressus, antice bilobatus callus posticus longitudinaliter extensus, extremis utrisque breviter liberis; *gynostemium* album, 2½ mm. longum, pes gynostemii 2½ mm. longus, pallide purpurascens; capsula purpurea, 5½ cm. longa.

TYPUS: Cameron Highlands, 4,800 ft. alt., leg. Holttum August. 1946.

Found on a tree in valley forest near waterfall; described from living plant.

Thrixspermum (§ Dendrocolla) **brevicapsularis** Holtt., sp. nov. **Fig. 5.**

Caulis 18 cm. longus, multifoliatus, internodia 10 mm. longa; *folia* 4–5 cm. longa, 5–6 mm. lata, valde carnosa, apice angusto bilobata, omnino purpureo-maculata; scapus 4–6 cm. longus, rachis ad 10 mm. longa, cylindrica, bracteae 1 mm. longae, tenues, apice tantum eminentes, pallide virides; flores eis *T. duplocallosi* similes, different: *sepalis petalisque* leviter lutescentibus, labello flavo, medio aurantiaco, basi aurantiaco-striato, callo antico sordide aurantiaco, callo postico antice sordide purpureo, lobo intermedio triangulare, margine non dentato, apice acuto, capsula 3–3½ cm. longa, viride, leviter purpureo-maculata.

TYPUS: Cameron Highlands, 4,800 ft., on an old coffee bush in exposed place, leg. Holttum Aug. 1946. Described from living plant.

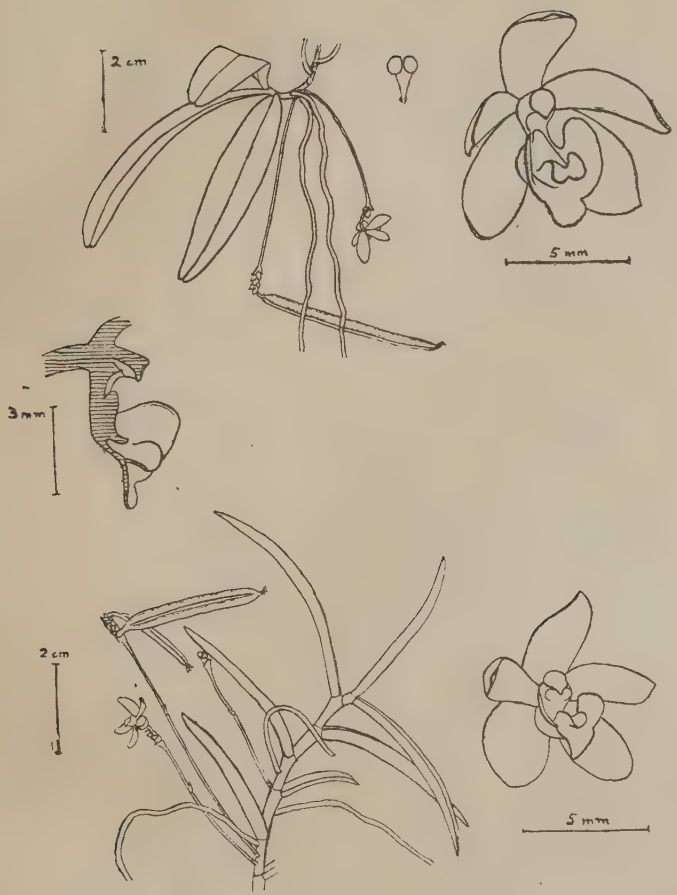

Fig. 5. (above) **Thrixspermum duplocallosum**: whole plant; flower; pollinia; longitudinal section of flower.
(below) **T. brevicapsularis**: apical part of plant and a single flower.

Thrixspermum (§ Dendrocolla) **Corneri** Holtt., sp. nov.

Caulis brevis, c. 3–foliatus; *folia* teretia, ad 4 cm. longa, fere 3 mm. lata; scapus 10 mm. longus; rachis inflorescentiae incrassata, brevis; bracteae latae, breves, breviter acutae; pedicellus cum ovario 5 mm. longus; flores pallide flavescentes, labello pallide brunneo-maculato; *sepalum dorsale* 4½ mm. longum, 3 mm. latum, late acutum; *sepala lateralia* late cum pede gynostemii juncta, 4 mm. lata; *petala* obovata, obtusa, 2½ mm. lata; labellum e basi gynostemii ad apicem lobi intermedii 4 mm. longum, ex apice loborum lateralium ad fundum sacci 7 mm. altum; lobi laterales erecti, late rotundati; lobus intermedius truncatus, carnosus, brevissime pilosus; callus bifidus; saccus intus e callo ad fundum fascia longe-pilosa instructus; *gynostemium* breve, pes gynostemii 2½ mm. longum.

TYPUS: Mawai, Johore, by Sedili River, leg. E. J. H. Corner. (Specimen preserved in alcohol).

Thrixspermum platycaule Holtt., nom. nov.

Basinym: *Sarcochilus anceps* Ridl., J.S.B.R.A.S. 54: 53. 1909. (Not *Thrixspermum anceps* (Bl.) Rchb.f.).

I have examined the type of this species; the lip is that of Thrixspermum, not Sarcochilus.

Trichoglottis misera (Ridl.) Holtt., comb. nov.

Basinym: *Saccolabium miserum* Ridl., Journ. Linn. Soc. 32: 359. 1896.

The type of this species has the usual tongue of Trichoglottis at the base of the column, but not the horns on either side of the column usually found in that genus; there is a fleshy thickening on either side of the rostellum.

Uncifera tenuicaulis (Hk. f.) Holtt., comb. nov.

Basinym: *Saccolabium tenuicaule* Hk. f., F.B.I. 6: 64. 1890.

This species differs from the others hitherto referred to Uncifera in having inflorescences of 1–3 flowers, the spur curved upwards in front, hairs within the spur, and the tip of the stipes not recurved. In other respects it agrees with the other species of Uncifera, and it appears not to be referable to any other genus at present recognized.

CYPERACEAE

Mapania cuspidata (Miquel) Holtt., comb. nov.

Basinym: *Lepironia cuspidata* Miq., Fl. Ind. Bat. Suppl. 603. 1860.

Synonyms: *Lepironia humilis* Miq., Ill. Fl. Arch. Ind. **61**, t. 21. 1871. (but not *Pandanophyllum humile* Miq. 1855).

Mapania lucida N.E. Br. in Ill. Hort. **32**: 77, t. 557. 1885.

M. triquetra Ridl., Journ. Str. Br. R. Asiat. Soc. **41**: 51. 1903.

M. petiolata var. *cuspidata* Uittien, Rec. Trav. Bot. Néerl. **33**: 282. 1936.

This is perhaps not sharply distinct from *M. petiolata*, though extreme forms are very different. If the two are united, as by Uittien (l.c.), the name *cuspidata* must be used, being older. But I suggest maintaining them separate pending further field study.

Mapania insignis Holtt., sp. nov.

M. inopinatae Uittien affinis, differt foliis, scapis, spiculis multo majoribus.

Leaf-sheaths to 20 cm. long, petioles to 40 cm. long and 8 cm. wide, leaf-blades to 60 cm. long and 11 cm. wide, caudate apex to 15 cm. long. *Scape* 12–35 cm. long, 3–4 (–5?) mm. diameter, very shortly and densely rough-hairy throughout (almost as in *M. palustris*), rusty in appearance when dried, basal sheaths stiff, acute, to 8 cm. long. *Inflorescence* a head of 8–16 sessile spikelets, the whole 3½–6 cm. across, with stiff acute primary bracts to 3 cm. long. *Spikelets* 2–2½ cm. long, 1 cm. wide, the longer ones with acute apex. *Glumes* 9–11 mm. long, narrowly oblong with rounded apex, inner ones thin; *scales* as long as glumes, the lateral outer scales hairy on keels near apex only. *Nut* not seen.

TYPUS: Pahang, Gunong Tahan, 3,000 ft., S.F.N. 20584, leg. Holttum 27-8-1928. Also at same locality S.F.N. 8125 (Haniff & Nur) and Ridley 16192; and at Karak F.R., Pahang, S.F.N. 13883 (Best).

Like *M. inopinata*, this has the inflorescence of section Halostemma and the vegetative habit of *M. petiolata* C. B. Clarke which, on account of its simple spikelet, is placed in section Pandanophyllum. Clarke however reports (F.B.I. 6: 683) that *M. petiolata* (there called *M. humilis*) may have small secondary spikelets in the axils of the basal bracts, and so may other species, so that the distinction between the two sections is not a sharp one, and I doubt if it should be maintained. The group of *M. petiolata*

C. B. Cl., characterized by the petioled leaves, is however very distinct, and should perhaps constitute a separate section of the genus.

Mapania micropandanus Holtt., sp. nov.

Caulis erectus, radicibus rectis obliquis sustentus. *Folia* c. 30 cm. longa, 8–13 mm. lata, tenuia, pallida, basi leviter angustata et complanata, apice breviter et aequaliter angustata, non caudata, margine per totam longitudinem acute denticulata, *venae primariae* 3, media subtus laterales supra elevatae, omnes omnino denticulatae. *Scapus* brevissimus. *Spicula* florens 15 mm. longa, 5 mm. lata; *glumae* pallidae, tenues, 10 mm. longae, multinervosae, nervis concoloribus, in sicco leviter elevatis.

TYPUS: Johore, S. Kayu Ara, Mawai-Jemaluang Road, S.F.N. 29362, leg. E. J. H. Corner, 5th May 1935. Also Pulau Tioman, 1,000 ft., Burkill s.n. June 1915.

This little species, like a miniature Pandanus, occurs in dry Dryobalanops forest and in the drier parts of the (fresh-water) swampy forest in the Sedili River area, S.E. Johore. It is distinct from all other species in the shape and size of its leaves, which are in texture rather like those of *M. tenuiscapa* C. B. Cl. but shorter, shortly pointed, with only 3 main veins which are finely toothed on their raised surface almost from base to apex of the leaf (they are smooth in *M. tenuiscapa*).

Scleria cyathophora Holtt., sp. nov.

Caules approximati, fere 100 cm. longi, 2½–3 mm. diametro, acute triquetri, laeves. *Folia* maxima fere 30 cm. longa, 5 mm. lata, apice longe acuminata, haud scaberula; *vaginae* angustae, non alatae, acute triquetrae, minute pilosulae, os liguliforme semirotundatum. *Inflorescentia* terminalis angusta, fere 12–15 cm. longa, ramo infimo interdum sejuncto incluso; bracteae primariae inferae foliiformae, superiores parvae angustae; rami primarii adscendentes, non pedunculati, rami secundarii pauci, brevissimi. *Spiculae* rufobrunneae, 4 mm. longae, plerumque androgynae. *Antherae* 2½ mm. longae, anguste apiculatae. *Nux* haud 3 mm. longa, basi angusta, cetera ovoidea, versus apicem brevissime apiculatum obtuse triquetra, alba, lineis transversalibus irregularibus interruptis rufopuberulis instructa; *discus* cyathiformis, tenuis, pallide rufidulus, lobi lati, approximati, truncati, leviter et irregulariter dentati, fere ad medium nucis attingentes.

TYPUS: Pahang, Tasek Bera, S.F.N. 24042, leg. M. R. Henderson 14-10-1930 "in shallow water".

This is related to *S. Motleyi* C. B. Cl. (*S. gonocarpa* Ridl.), but is more slender, has much narrower leaves, and

the disc of the nut forms a cup nearly half the length of the nut. The shape and hairiness of the nut are almost as in *S. Motleyi,* but the upper part is less strongly angled and the apex slightly mucronate.

Diplacrum reticulatum Holtt., sp. nov. **Fig. 6.**

Habitu et foliis *D. caricino* affinis, differt internodiis brevioribus, plerumque 1–1½ cm. longis, membranis orum vaginarum firmioribus. *Spiculae feminae* 2·mm. longae, turbinatae, fere 1½ mm. latae, apice leviter acuminatae; *glumae* ovatae acutae convexae, nucem amplectentes, in

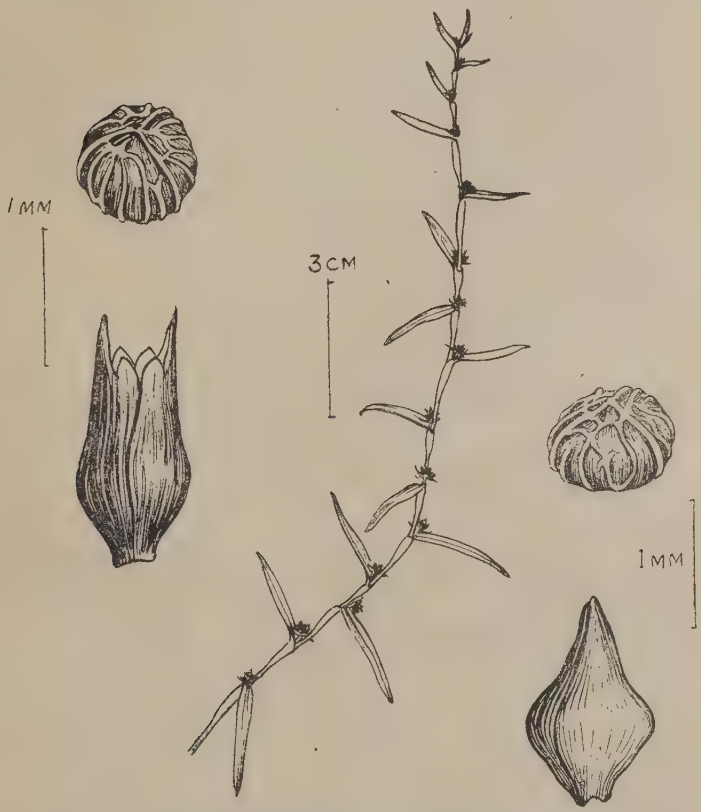

Fig. 6. **Diplacrum reticulatum,** with female spikelet and nut on right. On left, female spikelet and nut of **D. caricinum.**

sicco rubro-punctatae, venulae haud distinctae. *Nux* alba, globosa, depressa, longitudine haud 1 mm., latitudine c. 1¼ mm., tricarinata, inter carinas reticulata.

TYPUS: Pahang, Gua Tipus, Chigar Perah, S.F.N. 19411, leg. M. R. Henderson 15.10.1927; "in damp spot in lallang field". (Lallang is *Imperata cylindrica*).

This species is closely similar in habit to *D. caricinum*, but differs in its turbinate, not cylindric, female spikelets with entire glumes, and in the broader reticulate nut.

GRAMINEAE

Dendrocalamus dumosus (Ridl.) comb. nov.

Schizostachyum dumosum Ridl., Journ. Str. Br. R. Asiat. Soc. **61**: 64. 1912.

The spikelets of this species are one-flowered, and in every essential agree with the one-flowered spikelets of *D. pendulus* Ridl. (which species has either one or two-flowered spikelets). The spikelets are entirely unlike Schizostachyum.

Dendrocalamus elegans (Ridl.) comb. nov.

Schizostachyum elegans Ridl., Journ. Str. Br. R. Asiat. Soc. **73**: 146. 1916.

The spikelets of this also agree very closely with those of *D. pendulus* Ridl., having one or two florets.

Dendrocalamus sinuatus (Gamble) comb. nov.

Oxytenanthera sinuata Gamble, Ann. Calc. **7**: 71, pl. 62. 1896.

I have stated the case for the union of Oxytenanthera with Dendrocalamus in Journ. Arn. Arb. **27**: 340. 1946.

Schizostachyum Ridleyi (Gamble) comb. nov.

Ochlandra Ridleyi Gamble, Ann. Calc. **7**: 127, pl. 114. 1896.

In every respect except lodicules (of which there are 6–10), this species is extremely near to *S. latifolium* Gamble, which itself has 4 lodicules, and often basal parts of anthers winged as if in transition to lodicules. There is no evidence that *S. Ridleyi* has a large fruit, which is one of the characteristic features of Ochlandra; and Ochlandra is otherwise only known from southern India.

Spodiopogon velutinus sp. nov.

Culmi ad 300 cm. longi, procumbentes, 5–6 mm. diametro apicem versus; *folii lamina* vulgo 30 cm. longa, 4–4·5 cm. lata, apice acuminata, basi cuneata, infra molliter velutina, supra glabra, margine scabrida, basi pilis paucis longis albidis munita, costa pallida; *vagina* hirsuta vel fere glabra; *ligula* haud 1 mm. alta, glabra. *Panicula* c. 25 cm. longa, axis primarius hirsutus; ramuli ultimi tenues, glabri apicem versus dilatati, post delapsu spicularum apice crateriformes, ramulus quisque vulgo apice spiculas tres, infra apicem spiculas binas ferens; pedicelli c. 2 mm. longi; callus pilis 5–7 mm. longis patentibus instructus; *spiculae* c. 3¼ mm. longi; *glumae glabrae*, gluma inferior irregulariter 6–venulosa; *lemma inferius* latum, leviter trilobatum; *lemma superius* fere dimidio bilobatum, arista pallida, curvata, e basi lemmatis 7–8 mm. longa; *palea* brevis, profunde bilobata, ciliata; antherae 2 mm. longae; stigmata purpurea.

TYPUS: Cameron Highlands, 5,500 ft. alt., in overgrown tea estate clearing, leg. Holttum, 4.8.1946.

Chrysopogon nemoralis (Balansa) comb. nov.

Andropogon nemoralis Balansa in Morot, Journ. de Bot. 1890: 113.

Vetiveria nemoralis A. Camus, Fl. Gen. Indoch. 7: 329, 1922.

This species differs from most other species of Chrysopogon in having two sessile spikelets on the larger branches. In other respects it agrees with Chrysopogon, and is very different from the ample panicle of Vetiveria.

Rottboellia foveolata sp. nov.

Culmi fasciati, tenues, c. 50–80 cm. alti. *Laminae foliorum* ad 25 cm. longae et 6 mm. latae, basin versus sensim angustatae, supra brevissime dense pubescens; *vaginae* margine ciliatae, ad nodos breviter hirsutae; *ligula* brevis, ciliata. *Racemi* c. 6 cm. longi, c. 2 mm. lati; internodia 3 mm. longa, glabra, pedicelli spicularum paullo breviora. *Spiculae sessiles* plerumque (semper?) singulares, internodiis aequilongae, glabrae; *gluma inferior* rigida, pallida, ovata, obtusa, apice leviter retusa, carinis haud alatis, dorso omnino foveolata, foveis irregulariter quadrangularibus, in seriebus c. 6 longitudinaliter dispositis (seriebus apicem versus paucioribus), parietibus transversis spinulis minutis adscendentibus instructis; *gluma superior* tenuis, e basi ad apicem carinata, carina apicem versus anguste alata; *lemma flosculae inferioris* 2 mm. longum, latum, tenuissimum, enervatum, palea aequilonga, angustior,

2–carinata; *lemma flosculae superioris* inferiori aequilongum, palea brevior; *stamina* 3, antherae purpureae, 1½ mm. longae. *Spiculae pedicellati* 1½ mm. longae, glumis 2 tantum constatae; gluma inferior 4–venulosa, carina anguste alata; gluma superior angustior, 3–venulosa; pedicellus liberus (non cum internodio adnatus).

TYPUS: Setul. leg. Ridley 15231, March 1910.

This is nearly allied to *R. mollicoma* Hance, but differs in the quite glabrous inflorescences, and in the sharply defined cross-veins connecting the raised veins of the lower glume, forming series of irregular but distinct subquadrangular pits, whereas the cross-connections between the veins of *R. mollicoma* are formed only by the swollen bases of the hairs. The cross-walls of *R. foveolata* bear small spine-like outgrowths, often more than one.

NEW SPECIES OF EUGENIA LINN. (MYRTACEAE)

By M. R. HENDERSON, F.L.S.

The following new species of *Eugenia* are described in anticipation of a critical review of the genus in the Malay Peninsula which it is hoped will be published in the near future.

Eugenia (§ Syzygium) **atronervia** sp. nov. Fig. 1.

E. Dyeriana King et *E. Hemsleyana* King probabiliter affinis, sed foliis multo maioribus, inflorescentiis brevioribus, floribus multo maioribus differt; necnon *E. pergamentacea* King affinis, sed floribus maioribus, nervis supra non impressis differt.

A *tree* 10–12 m. tall, 10 cm. diam. 2 m. from ground, with low flattened stilt roots. *Bark* dull rufous fawn, smooth, entire, becoming slightly creviced, not pustulate or flaky; inner bark dull madder brown or purplish brown, wood dull reddish brown.

Twigs very stout, rounded or somewhat flattened, not angled, bark black or brown, smooth or somewhat ridged, not flaky.

Leaves large, narrowly elliptic, or oblong elliptic or oblong lanceolate, up to c. 36 cm. long and 16 cm. broad, apex shortly and abruptly acuminate, base shortly narrowed and more or less decurrent on petiole; upper surface drying dull fuscous brown, lower surface a warm red brown; *primary nerves* c. 17–21 pairs, somewhat raised above and quite conspicuous as are the reticulations, strongly raised and black below, the lax reticulations also raised and evident, but much less conspicuous than the primary nerves; secondaries few to none; primaries nearly straight or gently curving up to a slightly looped, well marked intramarginal nerve c. 3 mm. from leaf margin; *petiole* very stout, widely channelled above, drying black, c. 2 cm. long.

Inflorescences terminal, from 2–5·5 cm. long, stout, the largest with a 4-angled peduncle c. 2 cm. long, with 2 pairs of stout branchlets, the lower pair 7–8 mm. long, each with 3 terminal flowers, the upper pair distant from the lower by 2·5 cm., each c. 2 mm. long with three flowers each, inflorescence axis produced 5 mm. above upper branchlets and bearing 4 flowers; other inflorescences much shorter, c. 2 cm. long, with one pair of very short stout branchlets each with 3 flowers, and three terminal flowers.

Flowers sessile, buds more or less obovoid, *calyx* campanulate or obconic, rather abruptly narrowed into a

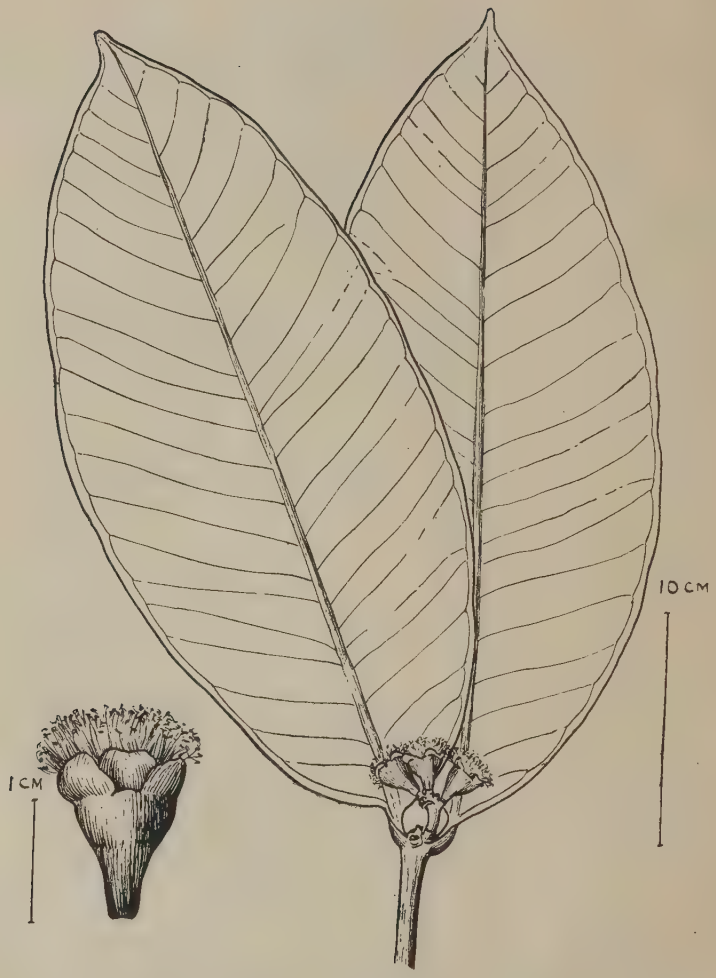

Fig. 1. **Eugenia atronervia** HENDERSON Del: CHAN YORK CHYE

very short stout pseudostalk, c. 1·8 cm. long, flower c. 2 cm. across when expanded; calyx lobes 4, persistent, broad, rounded, c. 5 mm. long and 6–7 mm. broad; *petals* free, not quickly deciduous, of the same shape and size as sepals but thinner in texture; *stamens* c. 1 cm. long; *style* c. 1·5 cm. long; *ovary* 2-celled, multiovulate.

Fruit more or less depressed globose, up to c. 4 cm. diam., apex with a rather deep excavation c. 5 mm. diam., fringed by the very short (c. 1 mm. tall) remains of calyx tube, bearing withered stamens; surface of fruit nearly black, corrugate with broken shallow vertical ridges and furrows, smooth in places; pericarp probably pulpy or fleshy, up to c. 6 mm. thick; seed 1, transversely oblong globose, c. 2·7 cm. across, testa very thick, adhering closely to cotyledons; cotyledons side by side, nearly equal, outer surface finely rugulose, inner faces conspicuously glandular pustulate, nearly plane with a shallow wide depression, sessile, plumule and radicle rather small, attached near periphery of seed.

JOHORE: Sungai Kayu Ara, Mawai-Jemaluang road, at low elevations in dry *Dryobalanops* forest, *SFN 29328 (Corner)*, TYPE collection, holotype in Herb. Singapore; 2nd mile, Mawai-Jemaluang road, *Corner s.n.*

There are two sheets of *Scortechini 2018*, Perak, sine loc., in Herb. Calcutta which may be this species, but the material is poor, one sheet consisting of incomplete leaves only, the other with flowers in young bud.

Eugenia (§ Syzygium) **Millsii** sp. nov. Fig. 2.

Arbor c. 14–17 m. alta, trunco c. 45 cm. diam. *Ramuli* teretes, crassi, cortice laevi pallide ochraceo vel fusco. *Folia* coriacea, anguste elliptica vel oblongo-elliptica, ad 15 cm. longa et 6 cm. lata, basi cuneata, apice breviter et obtuse acuta vel interdum plus minusve acuminata, minute punctata; *petiolis* 5–10 mm. longis; *venis primariis* utrinque 5–10, supra inconspicuis, in venas duas intra marginem confluentibus, in sicco venulis reticulatis inconspicuis vel obscuris. *Paniculae* terminales fasciculatae ad 7–8 cm. longae, pedunculis crassis, plus minusve tetragonis. *Flores* 3 in apice ramulorum, flos centralis sessilis, exteriori pedicellati. *Calycis* tubus campanulatus, c. 4 mm. longus, lobis 4 semiorbicularibus, persistentibus, c. 4 mm. longis et 5 mm. latis. *Petala* 4, subpersistentia, orbicularia, 6 mm. longa et 5 mm. lata, libera. *Stamina* ad 10 mm. longa, antheris oblongis vel late ellipticis, 0·5–0·6 mm. longis. *Ovarium* 2-loculare. *Fructus* ignotus.

A *tree* c. 14–17 metres tall, diam. c. 45. cm. at 2 m. from ground, trunk fluted up to c. 2 m. from ground. *Bark* smooth, brownish grey with irregular surface cracks. Twigs terete, stout, bark greyish white or pale brown, smooth, somewhat polished.

Leaves coriaceous, elliptic or oblong elliptic, up to c. 15 cm. long and 6 cm. broad, base cuneate, apex shortly and bluntly acute or sometimes more or less acuminate, drying dull brown or cinereous above, dull warm brown below, both

Fig. 2. **Eugenia Millsii** HENDERSON Del: CHAN YORK CHYE

surfaces minutely punctate; *petiole* pale coloured, 5–10 mm. long; midrib impressed above raised below; *primary nerves* 5–10 pairs, visible but not conspicuous above, very slightly raised and very slightly channelled, raised below and more or less conspicuous, the second or third pair from the base initiating a conspicuous intramarginal nerve 5–8 mm. from the leaf margin, the basal one or two pairs running up in a fainter intramarginal nerve c. 1–3 mm. from margin; secondaries a little finer and less conspicuous than primaries, reticulations practically invisible when dry.

Inflorescences terminal or from upper axils, of fascicled panicles not exceeding 7–8 cm. long, peduncles stout with pale bark, more or less 4-angled and striate. *Flowers* in

threes at ends of branchlets, the centre flower of the triads sessile, the two outers on very short stout pedicels; *calyx* tube campanulate, c. 4 mm. long, and slightly less across base of lobes, slightly contracted just below lobes, narrowed to a stout pseudostalk less than 1 mm. long; lobes 4, semiorbicular, persistent, c. 4 mm. tall and 5 mm. wide; *petals* 4, persistent for some time after the flower is fully open, orbicular, 6 mm. tall and 6·5 mm. wide, free; *stamens* numerous, longest filaments c. 10 mm. long, anthers oblong or broadly elliptic, 0·5–0·6 mm. long; *ovary* 2-celled with many ovules; *fruit* unknown.

KEDAH: Sungai Terap, near Selama, in forest on riverbank at low altitude, *SFN 35431* (*Henderson*), TYPE collection, holotype in Herb. Singapore.

Outside of calyx tube and disc pale green; sepals white or very pale green; petals and stamens white. Very conspicuous in flower and visited by many insects, principally butterflies. Flowers in May.

The affinity of this species may be with *E. densiflora* var. *angustifolia*, but it differs in being a tall tree, not a bush or bushy tree, with flowers which are smaller and of a different colour. The venation also differs considerably.

Named after the late Mr. G. R. Mills, through whose hospitality I was enabled to make collections in the neighbourhood of Selama, Kedah, in May 1938.

Eugenia (§ Syzygium) **kemamanensis** sp. nov. Fig. 3.

Arbor 8–9 m. alta. *Ramuli* teretes. *Folia* elliptica vel elliptico-lanceolata, vel obovata, apice obtuse breviter acuminata, basi rotundata vel truncata, ad 18–19 cm. longa, 8–9 cm. lata; *nervis primariis* utrinque c. 9–11, supra impressis, inter se distantibus, vena intramarginali conjunctis; petioli c. 5 mm. longi. *Inflorescentiae* e nodis defoliatis ortae, c. 4 cm. longae. *Flores* in apice ramulorum 3, pedicellis c. 2 mm. longis. *Calyx* in alabastro obconicus, c. 4–6 mm. longus, lobis 4 rotundatis. *Petala* 4, calyptrata. *Stamina* in alabastro c. 4 mm. longa. *Stylus* in alabastro c. 4–5 mm. *Fructus* plus minusve globosus, c. 1·5 cm. diam., calycis lobis persistentibus coronatus.

A *tree* c. 8–9 m. tall, bark silvery grey, even, entire, inner bark pale pink, green below surface, wood pale buff. *Twigs* terete, with smooth or somewhat striate bark, pale silvery grey when dry. *Leaves* elliptic to elliptic lanceolate, sometimes more or less obovate, apex bluntly acute or shortly bluntly acuminate, narrowed to a rounded or truncate base, up to 18–19 cm. long and 8–9 cm. broad; drying pale brown on both sides, the upper surface usually rather darker than the lower, both surfaces minutely rugose when dry; midrib deeply impressed above, strongly elevate

below; *primary nerves* distant, c. 9–11 pairs, fine and sunk above, raised below, slender but conspicuous, meeting in a well marked looped intramarginal nerve c. 0·5–1 cm. from leaf margin, with a much fainter intramarginal much nearer the margin; reticulations very faint or invisible above, very fine and lax below; *petiole* pale, rather stout, c. 5 mm. long.

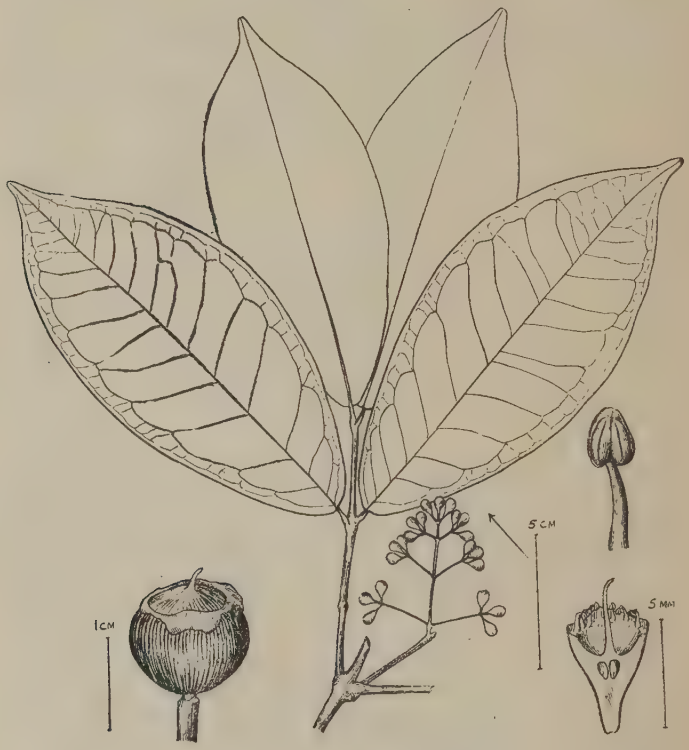

Fig. 3. **Eugenia kemamanensis** HENDERSON Del: CHAN YORK CHYE

Inflorescences from below leaves or on side twigs, practically sessile, c. 4 cm. long, rachis slender, 4-angled or compressed, with a few distant slender branchlets up to c. 2 cm. long, terminated by flowers in threes; pedicels not exceeding 2 mm. long. *Flower buds* (no opened flowers seen) c. 4–6 mm. long, obconic, tapering to a short pseudo-stalk; *calyx* lobes 4, broad, rounded, concave, c. 4–5 mm. broad and 3 mm. tall; *petals* 4, falling as a calyptra, but

separable, similar in shape to the calyx lobes but slightly larger and thinner in texture; *stamens* c. 4 mm. long; *style* c. 4–5 mm. long.

Fruit (unripe) more or less globose, crowned by the persistent sepals, c. 1·5 cm. diam., smooth or faintly vertically ridged, 1-seeded.

KEMAMAN: Ulu Ayam, Kajang, c. 500 ft., in forest, *SFN 30352* (*Corner*), TYPE collection, holotype in Herb. Singapore. Flowers and unripe fruit in November. "Fruit pale green, flushed pink on one side (unripe); calyx and pedicels often flushed pink."

Although very little material of this species has been collected, it appears to be sufficiently distinct. The minutely wrinkled surfaces give the dried leaves a curiously leathery appearance.

Fruit preserved in alcohol is globose to depressed globose, up to c. 2–2·3 cm. diam., calyx rim very wide, c. 1·4 cm. diam., apex of fruit not excavate but slightly convex with more or less persistent widely separated remains of calyx lobes. Pedicels of fruit much thicker than those of flowers. Pericarp fleshy, 1·5–2 mm. thick, the brownish testa remaining on seed when pericarp is removed. Cotyledons side by side, nearly equal, surface dark, finely rugulose and wrinkled, opposing faces nearly plane, except for a narrow radial ridge on one fitting into a corresponding groove on the other, shortly broadly stalked, radicle very small, plumule evident.

Eugenia (§ Syzygium) **Ngadimaniana** sp. nov. Fig. 4.

Arbor c. 20 m. alta. *Ramuli* teretes. *Folia* anguste elliptica vel elliptico-lanceolata vel oblongo-elliptica, ad c. 13 cm. longa et 5 cm. lata, apice abrupte acuminata, plus minusve caudato-acuminata, basi in petiolum longiter angustata, costa media supra impressa, subtus elevata; *venis primariis* utrinque c. 7–13, 5–10 mm. inter se distantibus, supra haud conspicuis, subtus teneribus, prominulis, in venam intramarginalem inconspicuam conjunctis, venis secundariis et reticulationibus supra obscuris, venis secundariis subtus teneribus. *Petioli* 1–1·5 cm. longi. *Inflorescentiae* terminales vel ex axillis foliorum superiorum, paniculatae, ad c. 9 cm. longae, pedunculatae. *Flores* sessiles, bracteolis oblongo-lanceolatis subacutis, subpersistentibus, alabastris obovoideis c. 6–6·5 mm. longis. *Calyx* obconicus, 3–4 mm. longus, lobis 5, c. 2 mm. latis et 0.2 mm. altis, acutis vel subacutis. *Petala* calyptratim decidua. *Stamina* ad c. 8 mm. longa, antheris parvis, c. 0·2 mm. diam., glandula inconspicua. *Ovarium* biloculare. *Bacca* ovoidea ad obovoidea, c. 2 cm. longa et 1·25 cm. lata, apice umbilico 2–3 mm. diam. calycis lobis persistentibus coronato.

A *tree* c. 20 metres tall. *Bark* pale brown or fawn brown, more or less smooth with fine irregular cracks, scaling in occasional irregular pieces, not papery flaky, with irregular longitudinal pits or dimples; inner bark thick, c. 1 cm., dull red or reddish brown. *Twigs* terete, youngest with smooth or slightly pustulate dark brown or reddish brown or greyish brown bark, older twigs with reddish bark longitudinally cracked and sometimes slightly flaky. *Leaves* thinly coriaceous, from c. 6 cm. long and 3·5 cm. broad or occasionally smaller to c. 13 cm. × 5 cm., narrowly elliptic

Fig. 4. **Eugenia Ngadimaniana** HENDERSON Del: CHAN YORK CHYE

or elliptic lanceolate or oblong elliptic, apex abruptly acuminate, more or less caudate acuminate, acumen 1–1·5 cm. long, base long narrowed on to petiole; upper surface when dry smooth and often shining, pale brown to dark brown, minutely and often obscurely pitted, lower surface usually paler, with minute slightly raised gland dots; midrib impressed above in a dark coloured channel, raised below; *primary nerves* c. 7–13 pairs, 5–10 mm. distant, slender but distinguishable from secondaries, sunk in narrow channels and not conspicuous above, slightly elevate below,

meeting in an inconspicuous intramarginal nerve 1–2 mm. from leaf margin; secondaries and reticulations almost invisible above,secondaries below nearly as conspicuous as primaries but distinguishable from them, reticulations below usually faint; petiole slender, 1–1·5 cm. long, reddish brown, finely wrinkled, channelled above.

Panicles terminal or from upper axils, solitary or more usually several from each axil or branchlet ends, up to c. 9 cm. long, peduncle 2–5 cm. long, slightly angled or compressed, bark pale, greenish brown, longitudinally wrinkled; branchlets 2–4 pairs, the lowest up to c. 2 cm. long, the upper shorter, almost horizontal or curving upwards, *flowers* crowded at branchlet ends or at end of secondary branchlets c. 3–6 mm. long, sessile, bracteoles oblong lanceolate, subacute, c. 1·5 mm. long, subpersistent; buds more or less obovoid, c. 6–6·5 mm. long. *Calyx* obconic, 3–4 mm. long, c 3·5–4 mm. across mouth, without pseudostalk, lobes 5, shallow, broad, acute or subacute, inconspicuous, c. 2 mm. wide and 0·5 mm. tall. *Petals* falling in a calyptra but not agglutinated, more or less orbicular, c. 3 mm. diam., conspicuously gland dotted. *Stamens* numerous, filaments slender, terete, up to c. 8 mm. long, anthers very small, c. 0·2 mm. diam,, connective gland inconspicuous. *Ovary* 2-celled with several ovules in each cell.

Fruit when dry ovoid to obovoid, c. 2 cm. long and 1·25 cm. wide, black, finely wrinkled, apical umbilicus shallow, 2–3 mm. diam., its margin with the persistent hardly enlarged calyx lobes; fresh fruit when ripe dark green slightly flushed dull purplish red at apex, obscurely ridged vertically, oblong obovoid, apical umbilicus shallow, c. 3 mm. diam., bearing the 5 small not enlarged broadly triangular acute incurved calyx lobes and style base; pericarp pithy leathery, c. 2 mm. thick; seed 1, more or less oblong, testa thick, whitish pink, brittle crustaceous; cotyledons superposed, pale yellowish white, glistening, more or less equal, inner faces plane or slightly concave, sessile.

JOHORE: Sungai Kayu, Mawai-Jemaluang road, in swampy forest, *SFN 32152* (*Kiah*).

SINGAPORE: Bukit Timah Reserve, altitude under 500 ft., *SFN 36129* (*Ngadiman*), Tree No. 392, TYPE collection, holotype in Herb. Singapore; same locality, *SFN 37012, 37020* (*Ngadiman*).

Flowers have been collected in September and October, fruits in November and December.

Eugenia (§ Syzygium) **Kiahii** sp. nov. Fig. 5.

Arbor c. 12 m. alta. *Ramuli* teretes, crassi, cortice laevi. *Folia* valde coriacea, ovata vel orbicularia, vel late elliptica vel elliptico-oblonga ad c. 10 cm. longa et 9 cm. lata, basi

breviter cuneata vel rotundata ad petiolum brevissime et abrupte attenuata, apice rotundata vel breve obtuseque acuta vel apiculata; petiolis c. 1 cm. longis; *nervis primariis* tenuibus, utrinque c. 7–10, in venam arcuatim e margine 2–5 mm. distantem confluentibus. *Inflorescentiae* terminales, pedunculis c. 2·5 cm. longis. *Flores* in apice ramulorum dense dispositi, alabastris obovoideis c. 7–8 mm. longis. *Calycis* tubus anguste campanulatus in stipitem plus minusve abrupte attenuatus, c. 5–6 mm. longus, lobis 5,

Fig. 5. **Eugenia Kiahii** HENDERSON Del: CHAN YORK CHYE

triangulo-ovatis, obtusis, c. 1 mm. altis. *Petala* calyptratim decidua. *Stamina* 3·5–4 mm. longa, antheris globosis vel late triangulo-ovatis, c. 0·4 mm. diam. *Ovarium* 1–2–loculare, multiovulatum. *Fructus* ignotus.

A *tree* c. 12 metres tall. *Twigs* stout, terete, bark smooth, sometimes polished, grey brown or pale brown or greyish white.

Leaves very coriaceous, ovate or orbicular, or broadly ovate oblong or broadly elliptic or elliptic oblong, up to c. 10 cm. long and 9 cm. broad, base very shortly cuneate, or rounded and very shortly and abruptly narrowed to petiole, apex rounded or shortly and bluntly acute or apiculate; both surfaces drying pale reddish brown or the upper surface blackish brown and the lower dull warm brown, petiole c. 1 cm. long; midrib impressed above, elevate below; *primary nerves* fine, raised on both surfaces, slightly less conspicuous above than below, about 7–10 pairs, meeting in an intramarginal loop 3–5 mm. from leaf margin, secondaries and reticulations raised on both surfaces, almost as distinct as primaries.

Inflorescences short and dense, terminal, on stout peduncles c. 2·5 cm. long; peduncles and rachis as stout as twigs, more or less compressed, secondary branchlets also stout and angled, c. 1·5 cm. long, the flowers crowded at their apices or on tertiary branchlets c. 3 mm. long. *Flower* buds obovoid, c. 7–8 mm. long, *calyx* narrowly campanulate, narrowed rather abruptly into a stout pseudostalk which is rather variable in length; length of calyx tube including pseudostalk 5–6 mm., mouth with 5 rather distant triangular ovate blunt lobes c. 1 mm. tall. *Petals* calyptrate, leathery. *Stamens* 3·5–4 mm. long, anthers globose to broadly triangular ovate, c. 0·4 mm. diam., connective gland dark brown, conspicuous, finely gland dotted. *Ovary* 1–2–locular, multiovulate. *Fruit* unknown.

JOHORE: Sungai Kayu, Mawai-Jemaluang road, *SFN 32036* (*Kiah*), TYPE collection, holotype in Herb. Singapore; Sungai Kayu, in swampy forest, *SFN 29400* (*Corner*).

Eugenia (§ Syzygium) **Haniffii** sp. nov. Fig. 6.

Arbor 15 m. alta, ramulis teretis, fuscis; *foliis* oblongis vel elliptico-oblongis, in sicco olivaceis vel fuscis, basi cuneatis, apice acuminatis, ad 13 cm. longis et 5 cm. latis; *venis primariis* utrinque 25–40, tenuibus, vena intramarginali vix distincta; petiolis c. 5–7 mm. longis. *Paniculae* terminales, densae, ad 8 cm. longae, vulgo breviores, ramis primariis crassis, ramulis ultimis tenuioribus, plus minusve tetragonis. *Flores* 3 in apice ramulorum, exteriori pedicellati, pedicellis ad 0·8 mm. longis, flos centralis sessilis.

Calycis tubus anguste infundibuliformis, basi breve stipitatus, ad 4–6 mm. longus; lobis 4, conspicuis, persistentibus, c. 1·5 mm. altis et 2·5 mm. latis. *Petala* 4, membranacea, libera, subpersistentia. *Stamina* 9–12 mm. longa, stylus subaequilongus. *Ovarium* 2-loculare. *Fructus* globosi, c. 1·5 cm. diam., apice calycis margine et sepalis persistentibus coronati. *Semen* 1, globosum, cotyledonibus subaequalibus.

Fig. 6. **Eugenia Haniffii** HENDERSON Del: CHAN YORK CHYE

A tree 12–15 metres tall. *Twigs* rather stout, terete, their bark reddish brown, to the naked eye practically smooth, under a lens cracking longitudinally.

Leaves chartaceous, drying either greenish brown (recently collected specimens) or dull grey brown above and pale dull grey brown below (in older specimens), oblong to elliptic oblong, base cuneate, apex rather abruptly acuminate, up to c. 13 cm. long and 5 cm. broad; *petiole* slender, c. 5–7 mm. long, dark coloured when dry, narrowly channelled above; *midrib* sunk above, prominent below; *primary*

nerves fine, not more prominent than secondaries and hardly distinguishable from them, about 25–40 pairs, raised above and below, meeting in an inconspicuous intramarginal nerve c. 2–4 mm. from leaf margin, with an even more inconspicuous secondary intramarginal c. 1 mm. from margin; leaf margin slightly revolute when dry.

Panicles terminal, densely flowered, often much contracted, not exceeding 8 cm. long and usually much shorter, primary branches stout, with reddish brown bark as on twigs, ultimate branchlets finer, more or less 4-angled, with dark striate bark. *Flowers* in threes at ends of branchlets, the two outer on pedicels c. 0·8 mm. long, the central flower sessile. *Calyx* narrowly funnel shaped in bud, c. 4–6 mm. long including lobes, gradually narrowed to a slender pseudostalk, the centre flower of the triads with a slightly longer pseudostalk than the outers, calyx tube finely longitudinally striate and black when dry; lobes 4, conspicuous, broad, persistent after anthesis, c. 1·5 mm. high and 2·5 mm. wide, rather thick in texture with membranous edges. *Petals* 4, membranous, quite free and falling separately, persistent for some time after anthesis. *Stamens* 9–12 mm. long, *style* about as long. *Ovary* 2-locular with many ovules.

Fruit globose or slightly depressed globose, c. 1·5 cm. diam., (?not fully ripe), with shallow inconspicuous vertical ridges, crowned by calyx limb and persistent sepals; pericarp thin, tough; seed 1, globose, the cotyledons more or less equal, attached to hypocotyle near centre of opposing faces.

PENANG: Penara Bukit, c. 1,000 ft., *Curtis 794*, TYPE collection, holotype in Herb. Singapore. (One sheet of this collection is written up in King's hand as *E. densiflora* Duthie).

SELANGOR: 20th mile, Ginting Simpah, *Forest Dept. FMS 12860;* 23rd mile, Ginting Simpah, *Forest Dept. FMS 13383.*

Probably allied to *E. oblata* Roxb. from which it differs in the smaller flowers, more deeply lobed calyx, denser inflorescence, thinner leaves with finer and closer venation and the intramarginal nerve farther from the leaf margin. Also allied to *E. longiflora* F. Vill.

Named after the late Mohamed Haniff, who was for many years attached to the Gardens Department of the Straits Settlements.

Eugenia (§ Syzygium) **camptophylla** sp. nov. Fig. 7.

E. inophylla Roxb. affinis sed lobis calycis maioribus, foliis angustioribus, venis paucioribus; necnon *E. oblata* Roxb. affinis sed floribus angustioribus et minoribus, foliis multo angustioribus, venis et venulis minus prominentibus.

A *tree* 12–15 metres tall, stem 20–23 cm. diam. (ex Kunstler). *Twigs* smooth, terete, bark dull brown; *leaves* lanceolate or narrowly elliptic lanceolate, or somewhat ovate-lanceolate, up to c. 13 cm. long and 4 cm. broad, apex long acuminate, often folded or bent sideways when dry, base long narrowed and somewhat decurrent on petiole; upper surface drying blackish brown, lower surface dull reddish brown; midrib sunk above in a narrow channel, raised below; *primary nerves* about 20 pairs, very faint above, slightly raised and channelled, very slender and inconspicuous below, slightly raised, meeting in a very fine intramarginal nerve 1–2 mm. from the recurved leaf margin; secondaries and reticulations almost invisible above, a little less conspicuous than primaries below; *petiole* up to c. 1 cm. long, slender, black, wrinkled, deeply channelled above.

Fig. 7. **Eugenia camptophylla** HENDERSON Del: CHAN YORK CHYE

Inflorescence a spreading panicle, or several together, terminal or from upper one or two axils, on a peduncle up to c. 4 cm. long, but usually much shorter and not exceeding c. 1 cm., peduncle and inflorescence branches rather slender,

strongly angled, with striate bark, inflorescence up to c. 9·5 cm. long and 6 cm. across. *Flowers* densely crowded at ends of branchlets, c. 1 cm. long, sessile, bracteoles small and inconspicuous, soon falling; *calyx* in bud funnel shaped, c. 6 mm. long and 3 mm. across mouth, tapering gradually from apex to base, the pseudostalk c. 2–3 mm. long, but not sharply marked off, calyx mouth with 5 broad shallow inconspicuous blunt or subacute lobes c. 1·25 mm. wide and 0·5 mm. high, but variable in size, persisting for some time after the flower has opened and the stamens fallen; *petals* probably falling as a calyptra but easily separable, more or less orbicular, c. 3 mm. diam; *stamens* numerous, filaments slender, up to c. 8 mm. long, anthers triangular ovate, c. 0·5 mm. long, connective produced beyond anthers into a narrow triangular gland; *style* considerably stouter than filaments, c. 6 mm. long. *Fruit* unknown.

PERAK: Gopeng, 500–800 ft., open jungle in hilly locality, *Kunstler 5994*, TYPE collection, holotype in Herb. Calcutta.

Known only from the type collection of which I have seen three sheets in Herb. Calcutta and two in Herb. Dehra Dun.

The extension of the connective in the stamens beyond the anthers into a narrow triangular gland seems to be rare in Eugenia and has been seen otherwise only in an unidentified species of unknown origin cultivated in the Botanic Gardens, Singapore.

Eugenia (§ Syzygium) **Brantiana** sp. nov. Fig. 8.

Frutex vel *arbor* parva; ramulis teretibus, cortice laevi; *foliis* oblongo-ellipticis ad ovatis, ad c. 13 cm. longis et 5 cm. latis, apice longe acuminatis, acumine ad 1–2 cm. longo, basi cuneatis ad petiolum attenuatis, petiolo c. 0·5 cm. longo; costa supra canaliculata, subtus elevata, *venis primariis* utrinque ad c. 15, supra haud conspicuis, subtus leviter elevatis submanifestis, in venam intramarginalem inconspicuam 1–2 mm. a margine distantem confluentibus; *inflorescentiis* terminalibus vel ex axillis foliorum superiorum, paniculatis, subsessilibus vel pedunculatis, ad c. 9 cm. longis, ramis primariis ad c. 2 cm. longis, floribus sessilibus, confertis; alabastris c. 1 cm. longis; *calycis* tubo c. 7–8 mm. longo, apice c. 5 mm. lato, basi stipitato (stipite c. 2–3 mm. longo), lobis inconspicuis, c. 0·75 mm. altis et 2–2·5 mm. latis, glandulosis; *staminibus* numerosissimis, 15–16 mm. longis, antheris oblongo-ovatis, 0·5–0·75 mm. longis, connectivo conspicue glanduloso-mucronato; *fructibus* ignotis.

A *shrub* or small *bushy tree*. *Branchlets* terete, bark smooth, grey brown to reddish. *Leaves* thinly coriaceous, oblong elliptic to ovate, up to c. 13 cm. long and 5 cm. broad,

Fig. 8. **Eugenia Brantiana** HENDERSON Del: CHAN YORK CHYE

apex long acuminate, acumen 1–2 cm. long, base cuneate and narrowed on to petiole, upper surface drying greenish to reddish brown, minutely gland dotted, lower surface greenish to brownish, paler than upper, minutely gland dotted; midrib shallowly impressed above, elevate below; *primary nerves* up to about 15 pairs, slender and not conspicuous above, pale and very slightly raised, slightly raised and slender below, a little more conspicuous than secondaries; secondaries and reticulations usually obscure above, visible below and almost as conspicuous as primaries; intramarginal nerve slender and inconspicuous, 1–2 mm. from margin; *petiole* c. 0·5 cm. long, drying dark red brown.

Inflorescence terminal or from upper axils, paniculate, up to c. 9 cm. long, nearly sessile or peduncles up to c. 3 cm.

long, primary branchlets up to c. 2 cm. long, flowers clustered either at ends of primary branchlets or of secondary branchlets c. 0·5–1 cm. long; bark of inflorescence reddish brown to greenish brown, peduncle more or less terete, branchlets compressed or more or less 4-angled; bracteoles very small and fugacious. *Flowers* sessile, buds c. 1 cm. long, *calyx* c. 7–8 mm. long, c. 5 mm. across mouth, very finely wrinkled, narrowed at base into a rather stout pseudostalk 2–3 mm. long, lobes broad, shallow, inconspicuous, c. 0·75 mm. high and 2–2·5 mm. wide, pellucidly gland dotted; *petals* with pellucid gland dots, falling in a calyptra; *stamens* very numerous, 15–16 mm. long, anthers ovate oblong, 0·5–0·75 mm. long, connective gland brown, conspicuous; *style* 12–13 mm. long; *ovary* 2-celled with several ovules in each cell; *fruit* unknown.

JOHORE: Sungai Pontian Besar, common on the river bank in the *Terminalia-Pandanus* zone, *SFN 36754* (*Henderson*), TYPE collection, holotype in Herb. Singapore; same locality, *SFN 36956* (*Corner & Henderson*).

Named after the late Mr. R. V. Brant, sometime Assistant Adviser, Pontian.

Allied to *E. inophylla* Roxb., but differing in the paler bark of the twigs, the paler leaves when dry, the much longer stamens, and in being a bush or small bushy tree of tidal rivers.

Eugenia (§ Syzygium) **pseudosyzygioides** sp. nov. Fig. 9.

E. cymosa Wight valde affinis, sed cortice trunci pallide laevi, cortice ramulorum pallidiore, stipite calycis longiore, tubo calycis infundibuliformis, in sicco pustulato et rugoso, petalis vulgo calyptratis differt.

Arbor 18–24 m. alta, c. 25–60 cm. diam. *Ramuli* teretes, graciles, laeves. *Folia* ovata, ovato-lanceolata ad oblongo-lanceolata, vel anguste elliptica, apice caudato-acuminata, basi cuneata, 4 cm. × 2 cm. ad 9·5 cm. × 4·5 cm., *petiolis* gracilibus, 3–5 mm. longis; *nervis primariis* numerosis. *Paniculae* terminales et axillares ad 7 cm. longae, vulgo 4–5 cm. longae. *Flores* sessiles, in apice ramulorum brevissimorum ternati vel pseudoumbellati; alabastris c. 5–6 mm. longis; *calycis* tubo infundibuliforme, breviter stipitato, lobis 5, c. 0·5 mm. latis et 0·3 mm. longis. *Petala* vulgo calyptrata, ?vel interdum libera. *Stamina* ad 5–6 mm. longa, antheris oblongis, c. 0·4 mm. longis. *Stylus* c. 5–6 mm. longus. *Ovarium* 2-loculare. *Fructus* ignotus.

A *tree* 18–24 metres tall, c. 25–60 cm. diam. 2 metres from ground, trunk cylindric. *Bark* dull greyish, pallid, smooth, entire, faintly marked with transverse ridges but even in other places; inner bark thin, greyish brown; wood

Fig. 9. **Eugenia pseudosyzygioides** HENDERSON Del: CHAN YORK CHYE.

pallid buff, darkening and turning brownish drab on exposure. *Twigs* slender, verete, their bark smooth or finely longitudinally cracked, the youngest twigs brown or reddish brown, the older ones whitey-brown to pale grey.

Leaves thinly coriaceous, ovate, ovate lanceolate to oblong lanceolate, or narrowly elliptic, apex caudate acuminate, the acumen up to 2 cm. long, base cuneate, variable in size from c. 4 cm. long and 2 cm. broad to 9·5 cm. long and 4·5 cm. broad; upper surface drying dull brown to lead colour, lower surface usually paler, brown to reddish brown; *petiole* slender, deeply and narrowly channelled above, wrinkled and pustulate below, dark red brown, 3–5 mm. long; midrib narrowly channelled above, raised below, more or less pustulate, especially towards petiole; *primary nerves* numerous, close and parallel, not distinguishable from secondaries, reticulations almost as conspicuous, all raised on upper surface and more strongly raised on lower surface, sometimes much darker than surrounding leaf surface; intramarginal vein very close to and partly hidden by the revolute margin; upper surface minutely punctate, lower surface sparsely black dotted.

Panicles axillary and terminal, up to c. 7 cm. long but usually 4–5 cm. long, peduncles and branches slender, spreading, compressed or angled, with dark, longitudinally wrinkled, often pustulate bark. *Flowers* sessile in threes at ends of very short branchlets, or these branchlets so reduced that the flowers appear umbellately arranged; flower buds c. 5–6 mm. long; *calyx tube* funnel shaped, usually more or less pustulate, narrowing to a slender pseudostalk, mouth with 5 shallow rounded broad lobes c. 0·5 mm. wide and 0·3 mm. high. *Petals* calyptrate, apparently occasionally free, orbicular. *Stamens* up to c. 5–6 mm. long, anthers oblong, c. 0·4 mm. long with conspicuous brown gland on connective. *Style* rather stout, 5–6 mm. long. *Ovary* 2-celled. *Fruit* unknown.

KEMAMAN: Bukit Kajang, 500 ft., *SFN 30451* (*Corner*), TYPE collection, holotype in Herb. Singapore, *SFN 30421* (*Corner*), *SFN 30497* (*Corner*). Flowers in November.

PERAK: Larut, within 100 ft., in open old jungle in low ground, *Kunstler 3422*, "leaves light green, very glossy", flowers in October.

This species is evidently closely allied to *E. cymosa* from which sterile specimens cannot be distinguished with certainty in the Herbarium, except for the usually narrower, more oblong leaves. In the field, however, the trees are quite distinct, *E. pseudosyzygioides* having a smooth pale bark, while *E. cymosa* has a dark red or fuscous brown bark which is more or less fissured and flaky.

Most of the specimens of *E. pseudosyzygioides* on which flowers at the proper stage are to be found, have calyptrate petals, whereas in most of the specimens of *E. cymosa* in Herb. Singapore the petals are free. Koorders & Valeton and King describe them as free, Gagnepain as calyptrate. It is not a very reliable character, for both free and calyptrate petals may be found on the same individual.

Eugenia (§ Syzygium) **praestigiosa** sp. nov. Fig. 10.

?Arbor. *Ramuli* teretes, laeves. *Folia* coriacea, oblongo-lanceolata vel oblongo-elliptica, ad c. 9 cm. longa et 3·75 cm. lata, apice acuminata, basi attenuata, supra punctata, subtus pustulato-punctata, punctis nigris densis; *nervis primariis* tenuibus utrinque 12–15, in venam submarginalem a margine c. 1 mm. distantem conjunctis, petiolis ad 1 cm. longis. *Inflorescentiae* fasciculatae, terminales vel axillares, spiciformes vel paniculatae pauci-ramosae, ad 4·5 cm. longae. *Flores* sessiles ad apice ramulorum conferti. *Calycis tubus* in alabastro c. 6–6·5 mm. longus et 3·5–4 mm. latus, anguste infundibuliformis, lobis 4 rotundatis persistentibus c. 2 mm.

Fig. 10. **Eugenia praestigiosa** HENDERSON Del: CHAN YORK CHYE

altis et 3 mm. latis. *Petala* 4, libera, reflexa, rotunda, c. 5 mm. diam., glandulosa. *Stamina* ad 9–10 mm. longa, antheris oblongis, 0·7–0·8 mm. longis. *Stylus* c. 8 mm. longus. *Ovarium* 2-loculare. *Fructus* ignotus.

?A tree, *twigs* terete, their bark smooth, not polished, dark brown or dark reddish brown, in places pale grey and finely cracked. *Leaves* coriaceous, oblong-lanceolate or oblong-elliptic, up to c. 9 cm. long and 3·75 cm. broad, apex acuminate, base narrowed, upper surface drying olivaceous brown or reddish brown, slightly shining, minutely and densely punctate, lower surface paler and duller, minutely and densely black pustulate-dotted; midrib sunk above, raised below and pustulate except at apex, and longitudinally wrinkled; *primary nerves* about 12–15 pairs, very fine and slender above, slightly raised, fine below but rather more conspicuous than on upper surface, raised, meeting in a fine intramarginal nerve c. 1 mm. from recurved leaf edge; secondary veins only partially visible above, reticulations very obscure or invisible, secondaries and reticulations fine and raised below but distinctly less conspicuous than primaries; petiole c. 1 cm. long, rather slender, deeply channelled above, drying black.

Inflorescences crowded, terminal or in upper axils, spiciform or paniculate with few branches, up to c. 4·5 cm. long, rachis compressed or angled with strongly striate pale brown bark. *Flowers* sessile, crowded at or near ends of inflorescence branches. *Calyx* in bud c. 6–6·5 mm. long and c. 3·5–4 mm. across mouth, obconic or campanulate and tapering gradually to base, somewhat striate, pseudostalk very short, not evident, rather abruptly expanded at the mouth into 4 deep rounded persistent lobes c. 2 mm. high and 3 mm. across. *Petals* 4, free, reflexed after flower opens, more or less orbicular, c. 5 mm. across, gland dotted. *Stamens* numerous, filaments slender, up to c. 9–10 mm. long, anthers oblong, c. 0·7–0·8 mm. long, connective gland obscure or absent. *Style* rather stout, tapering to apex, c. 8 mm. long. *Ovary* 2-celled with several or many ovules in each cell. *Fruit* unknown.

PERAK: sine loc., *Scortechini sine num.*, TYPE collection, holotype in Herb. Calcutta.

Unfortunately no indication of locality and no date or number is given on any of the five sheets of this collection in Herb. Calcutta.

This plant appears quite distinct from any other *Eugenia* described from the Malay Peninsula. The inflorescences recall those of *E. rugosa* Merr., but the flowers and foliage are quite different. The flowers resemble those of *E. longiflora* F. Vill., but are shorter, with more conspicuous petals, and the inflorescence and leaves differ considerably.

The plant is distinctive amongst the Peninsular species in its short crowded inflorescences, and the crowded flowers with conspicuous calyx lobes and petals.

Included in the same cover in Herb. Calcutta was a sheet of *Forbes 2985* from Sumatra. This is in fruit only and at first sight appears very close to *E. praestigiosa*, but it differs in having pale yellow and somewhat polished twigs, thinner leaves not punctate above, with shorter petioles. The inflorescences are very like those of *E. praestigiosa*. The fruit of Forbes' plant is smooth and oblong without persistent calyx lobes and is of the type associated with the clavate or peg-shaped flowers of such species as *E. attenuata* K. & V. The fruit of *E. praestigiosa* is more likely to resemble that of *E. longiflora*, probably with persistent calyx lobes.

Eugenia (§ Syzygium) **quadribracteata** sp. nov. Fig. 11.

Arbor c. 20 m. alta, glabra. *Folia* vulgo ellipticooblonga, ad 25 cm. longa et 10 cm. lata, apice breviter obtuse acuminata vel acuta, basi breviter acuminata et in petiolum breviter decurrentia, utrinque dense punctata; *venis primariis* tenuibus, numerosis, utrinque c. 60, vena intramarginali tenui distincta conjunctis; *petiolis* crassis c. 1–1·3 cm. longis. *Inflorescentiae* terminales vel interdum axillares, ad 9 cm. longae. *Flores* sessiles in apice ramulorum dense capitulati, bracteolis 4 persistentibus instructi. *Calyx* in alabastro plus minusve globosus, post anthesis obconicus, c. 3–4 mm. longus et 4–5 mm. latus, lobis 5, late triangularis, rotundatis. *Petala* calyptrata. *Stamina* c. 5–6 mm. longa, stylus aequilongus. *Fructus* immaturus plus minusve globosus, 5–6 mm. diam., calycis margine coronatus.

A *tree* c. 20 metres tall. *Twigs* stout, terete, bark smooth or creviced or slightly flaky, brown or greyish brown, the youngest twigs with quite smooth dark warm brown bark. *Leaves* generally oblong elliptic, occasionally tending to be ovate, up to c. 25 cm. long and 10 cm. broad, but generally rather smaller, apex shortly bluntly acuminate or acute, base shortly narrowed and slightly decurrent on petiole; *petiole* stout, drying black, c. 1–1·3 cm. long; *primary nerves* very numerous and close together, hardly distinguishable from secondaries, up to about 60 pairs, fine but distinctly elevate above and below, secondary nerves and reticulations little less conspicuous than primaries; intramarginal nerve as distinct as primaries, c. 2–3 mm. from the revolute leaf margin; upper surface drying dull greyish brown, densely and minutely punctate, lower surface rather warmer brown or reddish brown, also densely and minutely punctate.

Inflorescences terminal or occasionally axillary, sometimes fasciculate, axis and branches as stout as or stouter than twigs, rounded or compressed or angled, with almost black, finely striate bark, up to 9 cm. long, branches distant and short, usually horizontal or somewhat decurved. *Flowers* sessile, densely crowded in heads at the branch ends, each flower subtended by 4 broad, triangular, more or less persistent blunt bracteoles. *Calyx* more or less globose in bud, obconic after anthesis, c. 3–4 mm. long and 4–5 mm. across mouth, lobes 5, broadly and shallowly triangular, rounded or somewhat acute. *Petals* calyptrate. *Stamens* c. 5–6 mm. long, *style* about same length. Immature *fruit* globular or somewhat depressed globular, 5–6 mm. diam., crowned by calyx rim.

Fig. 11. **Eugenia quadribracteata** HENDERSON Del: CHAN YORK CHYE

PENANG: Waterfall, *Curtis s.n.*, undated, TYPE collection, holotype in Herb. Singapore.

JOHORE: Kota Tinggi-Mawai road, *SFN 30986* (*Corner*), frequent in drier parts of swampy forest.

Although Curtis' specimens are fairly complete, they appear not to have been taken up either by King in the "Materials" or by Ridley in his Flora.

The species is a distinct one in the large closely veined leaves and the stout inflorescence with the unusual arrangement of bracteolate flowers. It may be allied to *E. argutata* Koord. & Valet., of which I have seen no material.

Wray 3771, from Upper Perak, alt. 1,000 ft., two fruiting sheets of which are in Herb. Calcutta, may possibly belong here.

Eugenia (§ Syzygium) **cerina** sp. nov. Fig. 12.

E. punctulata King, Mat. F.M.P., No. 12, 122 (1901); Ridl., F.M.P., I. 747; Corner, Wayside Trees of Malaya, p. 502; non F. M. Bailey (1896). *Syzygium incarnatum* Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 195 (1939), non Eugenia incarnata *Elm.*

Arbor ad c. 27 m. alta. *Ramuli* teretes vel juniores compressi, cortice desquamante. *Folia* coriacea, obovata, oblanceolata vel interdum oblonga, apice rotundata, retusa, vel breviter et abrupte acuminata, basi sensim vel abrupte attenuata, 2·5–11 cm. longa, 1·5–5 cm. lata, margine recurva, costa media subtus prominente, supra impressa, *nervis primariis* utrinque c. 16 vel pluribus, indistinctis, vena intramarginali tenui conjunctis. *Petiolus* 0·5–1 cm. longus. *Paniculae* terminales vel interdum axillares, laxe ramosae, ad c. 12 cm. longae, ramis et ramulis compressis, striatis. *Flores* sessiles in apice ramulorum conferti. *Calyx* campanulatus vel obconicus, brevistipitatus, c. 2·25–2·5 mm. longus et 2 mm. latus, breviter et obscure 4-dentatus. *Petala* calyptrata. *Stamina* c. 15–30, filamentis complanatis, 0·5–0·75 mm. longis. *Stylus* c. 0·5 mm. longus. *Ovarium* biloculare. *Fructus* oblongo-obovoideus, 1·2–1·4 cm. longus, 7–8 mm. latus, apice complanatus et umbilicatus, umbilico calycis margine brevissimo cincto.

A *tree* up to c. 27 metres tall, fluted at base, or buttressed, the buttresses sometimes up to c. 1·5 metres, or cylindric, or with a few stilt roots. Bark of trunk reddish or reddish orange, rugose in older trees, more or less papery flaky, a thin green layer next to outer layers, then a buff or yellowish fibrous brittle inner layer, wood hard, pale buff.

Twigs terete or the youngest somewhat compressed, bark pale brown to reddish brown or pale greyish brown, thinly papery flaky. *Leaves* coriaceous, obovate, oblanceolate or occasionally oblong, apex rounded, retuse, or with a

short broad point, or abruptly acuminate with acute or blunt acumen, narrowed at base gradually or abruptly, 2·5–11 cm. long, 1·5–5 cm. broad; margins usually recurved when dry, upper surface olivaceous, pale brown or reddish brown to dark brown, usually dull, lower surface usually lighter; midrib depressed above, elevate and keeled below; *primary nerves* usually about 16 pairs but often more, not curving, usually slightly raised above but not conspicuous, more or less raised below, faint and with difficulty distinguishable from secondaries, meeting in a slender intramarginal nerve which is close to the leaf margin and often hidden by the recurved margin; secondaries and reticulations obscure or faint above, sometimes invisible below or sometimes almost as conspicuous as primaries. *Petiole* 0·5–1 cm. long, channelled above, keeled below,

Fig. 12. **Eugenia cerina** HENDERSON Del: CHAN YORK CHYE

Panicles terminal or occasionally from the upper axils, lax, up to c. 12 cm. long, branches spreading, compressed, finely striate with pale brown or brownish grey bark. *Flowers* small, sessile, crowded at ends of the short ultimate branchlets, bracts and bracteoles very small and inconspicuous; buds obovoid, c. 2·75–3·25 mm. long; *calyx* campanulate or obconic, c. 2·25–2·5 mm. long and 2 mm. across mouth, narrowed to a very short stout pseudostalk c. 0·5 mm. long, mouth very obscurely and shallowly 4-toothed; *petals* calyptrate; *stamens* c. 15–30, filaments 0·5–0·75 mm. long, broad and flattened, tapering slightly from base to apex, anthers small, oblong, connective gland small and inconspicuous; *style* c. 0·5 mm. long, narrowly conical; *ovary* 2-celled.

Fruit oblong-obovoid, apex flattened, 1·2–1·4 cm. long and 7–8 mm. wide at widest point, apex deeply and narrowly excavate, with very short calyx rim; pericarp fleshy, 3–4 mm. thick, seed more or less globose, c. 4 mm. diam., testa adhering to it but peeling off easily leaving a thicker inner layer beneath which is a mucilaginous coat; cotyledons more or less equal, opposing faces folded, with the large hypocotyle, which is grooved along one side, lying in the fold and extending to periphery of seed.

PERAK: Blanda Mabok, *Wray 3972*, TYPE collection, holotype in Herb. Singapore. Common in lowland forest from Perak to Singapore.

Distrib: Sumatra, Borneo.

A full explanation of the nomenclatorial problems connected with this species, and the reasons for redescribing it instead of merely giving it a new name will be given in the forthcoming critical account of *Eugenia* referred to in the prefatory note to this paper.

Eugenia (§ Syzygium) **nemestrina** sp. nov. Fig. 13.

Arbor 25–30 m. alta. *Ramuli* crassi, teretes, vel ad nodos plus minusve compressi, cortice laevi vel desquamante. *Folia* coriacea, anguste elliptica ad oblongo-elliptica, 6–11 cm. longa, 2–4·5 cm. lata, apice acuminata deflexa, basi cuneata in petiolum longiter attenuata; pagina inferiore minute nigro-punctata; *nervis primariis* utrinque c. 20–25, tenerrimis, supra inconspicuis vel obscuris, subtus inconspicuis, in venam intramarginalem e margine c. 1 mm. distantem conjunctis; *petiolis* 5–8 mm. longis, rugosis. *Inflorescentiae* corymbosae ad 8 cm. longae et latae, multiramosae. *Flores* vulgo 3 vel interdum 1 in apice ramulorum, sessiles vel pedicellati, pedicellis 2–4 mm. longis, alabastris c. 1·3–1·4 cm. longis. *Calycis* tubus cyathiformis, in stipitem 4–5 mm. longum attenuatus, apice c. 6 mm. latus, post anthesin infundibuliformis, apice c. 7 mm. latus, margine truncatus vel interdum cum dentibus minutissimis. *Petala*

calyptratim decidua. *Stamina* 1–2·5 cm. longa, antheris c. 0·5 mm. longis et 0·4 mm. latis, paullum breviore. *Ovarium* 2-loculare, multiovulatum. *Fructus* plus minusve globosus, c. 1·5 cm. diam, calycis margine undulato c. 2 mm. alto coronatus.

A *tree* 25–30 metres tall, slightly or prominently buttressed-fluted at base to 2 metres from ground. *Bark* rufous brown, fissured or distinctly scaly flaky, inner bark deep purple. *Twigs* stout, terete or more or less compressed at nodes, the youngest with smooth or striate or finely rugose pale brown bark, the older twigs with a pale layer scaling off and leaving scaly flaky red brown bark below.

Fig. 13. **Eugenia nemestrina** HENDERSON Del: CHAN YORK CHYE

Leaves decussate, narrowly elliptic to oblong elliptic, 6–11 cm. long, 2–4·5 cm. broad, coriaceous, in life dull green withering yellow, margins upcurled and apex reflexed, when dry upper surface pale brown or reddish brown, lower surface dull pale brown to whitish brown but not glaucous, apex acuminate and deflected sideways, base cuneate and long narrowed on to petiole; midrib sunk in a narrow channel above, strongly raised and keeled below; *primary nerves* very fine, c. 20–25 pairs, raised above and visible because of their pale colour, or in pale leaves almost invisible, hardly distinguishable from secondaries, fine and raised below, very little more conspicuous than secondaries and sometimes only distinguishable from them by their junction with the intramarginal vein, reticulations slightly thickened and raised; upper surface not punctate, lower minutely black dotted; intramarginal nerve fine, c. 1 mm. from the slightly revolute leaf margin; *petiole* 5–8 mm. long, of the same colour as the leaf and wrinkled.

Inflorescences corymbose, terminal, not exceeding c. 8 cm. long and wide, much branched, the primary branchlets about half as thick as twigs, of the same colour, bark longitudinally wrinkled and somewhat pustulate, the ultimate branchlets compressed and ridged. *Flowers* usually in threes or sometimes solitary at ends of branchlets, sessile or sometimes on pedicels 2–4 mm. long, or the outer two flowers of the triads shortly pedicelled and the central one sessile; buds c. 1·3–1·4 cm. long, including pseudostalk, calyx tube cyathiform, c. 6 mm. across mouth, tapering into a ridged pseudostalk c. 4–5 mm. long; mouth truncate or wavy or occasionally with exceedingly obscure teeth; after anthesis the calyx funnel shaped, c. 7 mm. across mouth. *Petals* calyptrate. *Stamens* numerous, 1–2·5 cm. long, filaments tapering very gradually from base to apex, anthers c. 0·5 mm. long and 0·4 mm. broad, apical gland distinct, dark coloured. *Style* a little shorter than stamens. *Ovary* 2-celled with many ovules in each cell.

Fruit smooth, more or less globular, c. 1·5 cm. diam., crowned by the very conspicuous undulating calyx rim c. 2 mm. high; pericarp 2–3 mm. thick, stripping easily from seed which is left without testa (alcohol material); cotyledons nearly equal, outer surfaces closely rugose, inner faces more or less plane, attached to the hypocotyle by short broad stalks either about the centre or near the periphery.

SINGAPORE: McRitchie Reservoir, *SFN 33590* (*Corner*), TYPE collection, holotype in Herb. Singapore; Selitar, near Nee Soon village, *SFN 37396* (*Corner*), Mandai road, *SFN 37252* (*Corner*).

Calyx pale green, gland dotted, petals white, stamen filaments white with green bases. Flowers smelling as those

of *E. grandis*. Flowers in July, December, January, fruits full grown and falling ripe in October.

It may seem surprising that there are still novelties to be found in the last remaining patches of forest in the island of Singapore, but that such is the case serves to emphasise the difficulties of collecting in tropical forests and to point to the exceeding usefulness of the trained *brok* monkeys (*Macacus nemestrina*) used as collectors by the Singapore Botanic Gardens. Ample material of this species was collected by one of them.

Eugenia (§ Syzygium) **taipingensis** sp. nov. Fig. 14.

Arbor 4·5–6 m. alta, trunco 8–13 cm. diam. *Ramuli* teretes, cortice pallide cano vel ultimi cortice fusco. *Folia* petiolata late ovata vel elliptica, ad c. 6·5 cm. longa et 3·5 cm. lata, apice abrupte acuminata, basi abrupte attenuata,

Fig. 14. **Eugenia taipingensis** HENDERSON Del: CHAN YORK CHYE

nervis primariis utrinque c. 10, tenuibus, utrinque prominulis, in venam marginalem e margine c. 1 mm. distantem conjunctis. *Paniculae* terminales ad c. 6 cm. longae et 4 cm. latae, densiflorae. *Flores* sessiles in apice ramulorum dense dispositi. *Calycis* tubus in alabastro anguste campanulatus, c. 4 mm. longus et 2–2·5 mm. latus, in stipitem c. 2 mm. longum productus, margine subtruncato. *Petala* calyptratim probabiliter decidua, glandulosa. *Stamina* ad c. 6 mm. longa, antherae c. 0·4–0·5 mm. longae, glandula satis conspicua. *Stylus* ad c. 5 mm. longus.

A low *tree* with spreading branches, 4·5–6 m. tall, stem 8–13 cm. diam. (*ex Kunstler*). *Twigs* smooth terete with pale whitey grey or brownish white bark or the youngest twigs with brown bark. *Leaves* coriaceous, broadly ovate or elliptic, sometimes tending to be obovate, up to c. 6·5 cm. long and 3·5 cm. broad, apex abruptly acuminate, acumen c. 1 cm. long, base abruptly narrowed and decurrent on petiole; upper surface drying dull brown or blackish brown, minutely punctate, lower surface usually reddish brown, with very minute and inconspicuous black gland dots, or none; midrib sunk above, raised below and slightly pustulate near base; *primary nerves* about 10 pairs, very slender and almost indistinguishable from secondaries and reticulations, raised and slender below, meeting in a slender and not conspicuous intramarginal nerve c. 1 mm. from margin; *petiole* 2–5 mm. long, black, wrinkled, channelled above.

Inflorescence terminal, paniculate, up to c. 6 cm. long and 4 cm. across, branchlets spreading, slender, angled, with brownish or greyish striate bark. *Flowers* crowded at ends of ultimate branchlets, sessile, bracteoles apparently very small and falling early; *calyx* tube in bud c. 4 mm. long and 2–2·5 mm. across mouth, striate when dry, narrowly campanulate, quickly contracted some way below mouth, then tapering gradually into a pseudostalk c. 2 mm. long, mouth truncate or wavy or at most with very obscure shallow lobes; *petals* probably falling as a calyptra, more or less agglutinated when dry, thick textured with conspicuous gland dots; *stamens* numerous, filaments slender, up to c. 6 mm. long, anthers c. 0·4–0·5 mm. long, connective gland conspicuous; *style* much stouter than filaments, c. 5 mm. long. *Fruit* unknown.

PERAK: Taiping, plains, *Wray 2703*, TYPE collection, holotype in Herb. Singapore; Taiping, within 100 ft., in open jungle, low wet ground, *Kunstler 8379*.

This species was included under *E. oleina* Wight (*E. myrtifolia* Roxb.) by King and presumably by Ridley, but it is very distinct from that species in its broader and more acuminate leaves with the nerves and reticulations raised above, and in its truncate calyx mouth.

Eugenia (§ Syzygium) **flosculifera** sp. nov. Fig. 15.

Arbor c. 40 m. alta. *Ramuli* teretes, laeves, cortice pallide, novelli fusci. *Folia* vulgo plus minusve obovata interdum elliptica vel oblongo-elliptica, ad c. 7 cm. longa et 3·5 cm. lata, apice abrupte acuminata, basi attenuata in petiolum decurrentia; *nervis primariis* utrinque ad c. 8, inter se 5–8 mm. distantibus, supra obscuris, subtus tenuibus sed distinctis, in venam intramarginalem a margine c. 3 mm. distantem conjunctis. *Petioli* ad c. 1 cm. longi. *Inflorescentiae* terminales vel ex axillis foliorum superiorum, paniculatae, ad 9 cm. longae. *Flores* parvi, sessiles, in apice

Fig. 15. **Eugenia flosculifera** HENDERSON Del: CHAN YORK CHYE

ramulorum 2 vel 3, alabastris c. 3 mm. longis. *Calyx* c. 2·5 mm. longus apice c. 1·75 mm. latus, lobis 4 late triangularibus obtusis vel subacutis, incurvatis, c. 1 mm. latis et 0·5 mm. altis, basi in stipitem c. 1 mm. longam attenuatus, supra ovarium abrupte contractus. *Petala* calyptrata. *Stamina* c. 16, 0·5–1 mm. longa, filamentis crassis, antheris plus minusve oblongis, 0·2–0·3 mm. longis, apice glandulosis. *Stylus* c. 0·5 mm. longus. *Ovarium* 2-loculare. *Fructus* late oblongus ad oblongo-obovoideus, ad c. 1·5 cm. longus et 1·5–1·75 cm. latus, apice depressus, umbilico conico 4–5 mm. diam., calycis margine minute coronato; pericarpium crassum, c. 5 mm. *Semen* 1, globosum, depresso-globosum vel obovoideum, cotyledonibus omnino conjunctis, ut pseudomonocotyledoneum.

A *tree* c. 40 metres tall, with steep narrow buttresses to c. 2 metres; crown large, spreading; *bark* light buff, slightly scaly flaky, smooth over large areas, slightly pustulate with scattered 3 mm. lenticels, otherwise entire; inner bark thick, pale brownish yellow with fine longitudinal sclerotic strands; wood pale brownish buff. Twigs rather slender, terete, smooth, bark pale whitey grey to very pale yellowish, somewhat polished, in places finely longitudinally cracked, sometimes the outer thin layer peeling off and showing a pale brown layer below; the very youngest shoots with brownish or reddish bark and often angled or channelled.

Leaves thinly coriaceous, usually obovate, sometimes elliptic or oblong elliptic, up to c. 7 cm. long and 3·5 cm. broad, but usually smaller, apex abruptly acuminate, acumen up to 1 cm. long, base long narrowed and decurrent on petiole; upper surface drying dull olivaceous brown or blackish brown, very minutely and almost invisibly punctate, lower surface paler brown or yellowish brown with rather sparse brownish gland dots; midrib sunk above in a narrow channel, raised below; *primary nerves* up to c. 8 pairs, often fewer, 5–8 mm. distant, hardly visible on upper surface, but if visible, slightly raised, fine and raised on lower surface, meeting in an intramarginal nerve c. 3 mm. from the slightly recurved margin; secondaries and reticulations invisible above, sufficiently distinct below but less conspicuous than primaries, reticulations lax; *petiole* up to c. 1 cm. long, drying dark, wrinkled, often finely glandular pustulate, narrowly channelled above.

Inflorescences terminal or from upper axils, paniculate, terminal panicles often fasciculate, up to 9 cm. long but usually shorter, primary branchlets ascending, up to c. 2 cm. long, secondary branchlets 5–7 mm. long, branchlets slender with brown striate bark sometimes dotted with paler glands. *Flowers* small, sessile or nearly so, in pairs or more usually in threes at branchlet ends, bracts and bracteoles

minute and not persistent; buds c. 3 mm. long. *Calyx* c. 2·5 mm. long, c. 1·75 mm. across lobes, tube brown or black when dry, finely wrinkled, lobes 4, broadly triangular, blunt or subacute, incurved, c. 0·5 mm. high and 1 mm. wide, tube more or less fusiform, suddenly contracted below lobes, swollen about ovary, then gradually narrowed to a pseudostalk c. 1 mm. long; *petals* pale brown when dry, calyptrate. *Stamens* about 16 in a single row on edge of disc, 0·5–1 mm. long, filaments stout, their upper part remaining sharply bent inwards until long after the flower opens; anthers more or less oblong, 0·2–0·3 mm. long, the apical connective gland conspicuous as a dark brown knob. *Style* c. 0·5 mm. long. *Ovary* 2-celled with few ovules in each cell.

Fruit pale shining green when ripe, broadly oblong to oblong obovoid, up to c. 1·5 cm. long and 1·5–1·75 cm. wide at widest point, apex depressed with a conical excavation 4–5 mm. diam., fringed with the minute calyx rim but without stamen or style remains; pericarp firm, green, slightly juicy, c. 5 mm. thick; seed one, globose or more or less depressed globose or obovoid, cotyledons dark blackish brown when ripe, testa thin, papery, loose, pale brown ; cotyledons apparently completely fused, no commissure visible, their centre occupied by an intrusion of ? placental tissue which disappears when seed is fully ripe.

SINGAPORE: Reservoir Jungle, *SFN 36133* (*Corner*), TYPE collection, holotype in Herb. Singapore. Flowers in March.

A very peculiar species, which might better be placed in a new section of the genus, known definitely only from this locality. The size of the tree, the smallness of the flowers and the peculiar seed readily distinguish it from all others.

What appears to be the same or a closely allied species was collected by E. J. H. Corner, *SFN 30481* at Bukit Kajang, Kemaman, alt. 500 ft., but there are some differences in foliage and flower characters, and fruit of the Kemaman plant is not yet known.

Eugenia (§ Syzygium) **pseudoclaviflora** sp. nov. Fig. 16.

Arbor 6–7 m. alta. *Ramuli* teretes, ultimi tetragoni. *Folia* petiolata, lanceolata vel oblongo-lanceolata, basi attenuata, apice in acumen longum acutum attenuata, 4–8 cm. longa, 1·25–2·5 cm. lata, in sicco supra virescentia, subtus flavescentia, nervis primariis utrinque c. 10, fere obscuris. *Cymae* axillares, sessiles vel breviter pedicellatae. *Flores* sessiles. *Calycis* tubus in sicco clavatus, parte limboidea cyathiformi, 4-dentata, basi in stipitem brevem attenuatus, ad 12·5 mm. longus. *Petala* calyptratim decidua

Fig. 16. **Eugenia pseudoclaviflora** HENDERSON Del: CHAN YORK CHYE

vel interdum libera. *Stamina* ad 4 mm. longa. *Stylus* ad c. 8 mm. longus. *Ovarium* 3-vel 2-loculare. *Fructus* ignotus.

A *tree* 6–7 metres tall. Two-year old *twigs* slender, terete, with dull blackish brown or reddish brown finely cracked bark; one year old twigs very slender, paler than the older twigs or not.

Leaves 4–8 cm. long, 1·25–2·5 cm. broad, lanceolate or oblong-lanceolate, base long narrowed, apex long acuminate or almost caudate acuminate, acumen acute; upper surface dull, smooth, punctate, drying greenish, lower surface drying yellowish, not gland dotted or punctate, margin somewhat thickened; midrib sunk above in a narrow channel, raised and conspicuous below, otherwise the nervation very indistinct or invisible above, only a little more conspicuous below and then only in young leaves; *primary nerves* c. 10 pairs, spaced, meeting in a very obscure intramarginal nerve close

to the leaf margin, reticulations almost or quite invisible; *petiole* blackish brown, wrinkled, up to c. 5 mm. long.

Cymes short, axillary, condensed, sessile or nearly so, shorter than leaves. *Flowers* sessile. *Calyx* narrowly clavate, the limb slightly cyathiform, the tube long narrowed, contracted at base into a short pseudostalk, slightly ribbed and finely rugulose-pustulate, c. 12·5 mm. long; lobes 4, broadly rounded, shallow, c. 0·4–0·5 mm. high. *Petals* usually calyptrate, the calyptra subpersistent, or the petals occasionally free, also subpersistent. *Stamens* up to 4·5 mm. long, filaments slender, anthers broadly elliptic or ovate, c. 0·5 mm. long and 0·3–0·4 mm. wide, connective gland inconspicuous. *Style* c. 8 mm. long, rather stout, more or less cylindric or very slightly fusiform in lower half, upper half tapering gradually upwards. *Ovary* 3 or 2 celled. *Fruit* unknown.

PAHANG: Track to Gunong Tahan, c. 1,000 ft., on ridge, *SFN 31755* (*Kiah*), TYPE collection, holotype in Herb. Singapore. Mature flowers in July.

The inflorescence of this species is very like that of *E. claviflora* Roxb., but the flowers are shorter and stouter; the foliage resembles that of *E. attenuata* Koord. & Valet., but the inflorescence and flowers differ considerably from that species.

§**Fissicalyx,** sect. nov.

Stamina a tubo calycis supra discum orta; post anthesin tubus calycis in lobas irregulares longitudinaliter fissus.

Calyx in bud c. 2·5 cm. long and 1 cm. broad; primary nerves c. 15 pairs, intramarginal nerve 0·5–0·7 cm. from margin .. .. .. *Symingtoniana.*

Calyx c. 4 cm. × 3 cm.; primary nerves 18–25 pairs, intramarginal nerve 2–3 mm. from margin *Watsoniana.*

Eugenia (§ Fissicalyx) **Symingtoniana** sp. nov. Fig. 17.

Arbor c. 3–13 m. alta. *Ramuli* teretes. *Folia* elliptica ad elliptico-oblonga, interdum oblongo-lanceolata, apice abrupte breviter acuminata vel interdum abrupte caudata, basi cuneata, ad 20 cm. longa et 10 cm. lata; *nervis primariis* utrinque ad c. 15, 0·75–2 cm. distantibus, supra impressis, subtus prominulis, in venam intramarginalem 0·5–0·7 cm. e margine conjunctis; petiolis ad 1 cm. longis. *Flos* sessilis, 1 vel interdum 2. Alabastri *calyx* subglobosus ad obovatus, 2·5 cm. longus et 1 cm. latus, deorsum in stipitem brevem attenuatus; lobis ?4; post anthesin tubo calycis in aliquot lobas irregulares longitudinaliter fisso. *Petala* ?4, libera, orbiculares, c. 5 mm. diam. *Stamina* e tubo calycis supra discum orta, filamentis numerosissimis, c. 1·5 cm. longis. *Stylus* c. 1 cm. longus. *Ovarium* 2-loculare, multiovulatum.

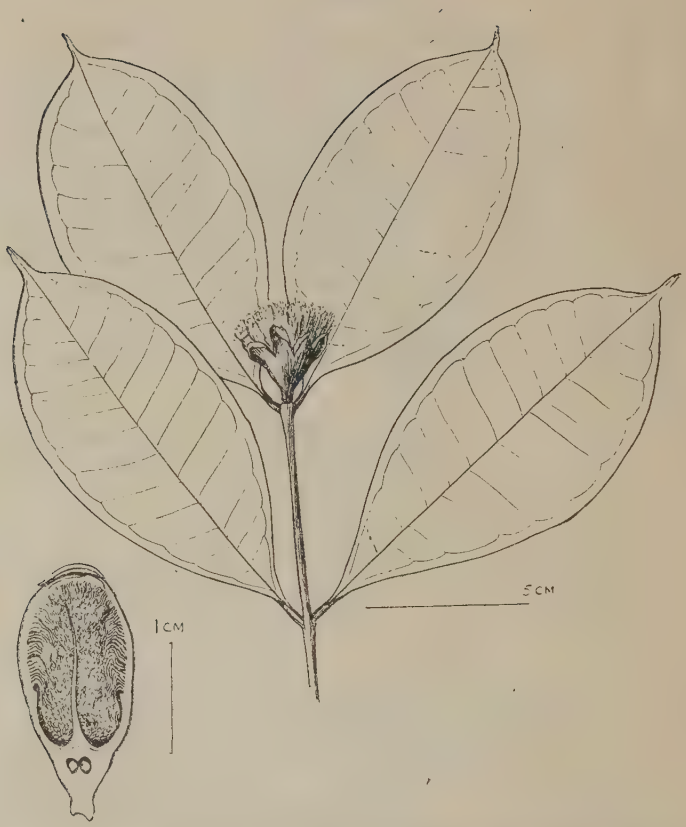

Fig. 17. Eugenia Symingtoniana HENDERSON Del: CHAN YORK CHYE

A *tree* c. 3–13 metres tall. *Twigs* terete, bark drying whitish or greyish white, smooth, with a slight tendency to flaking. *Leaves* elliptic to elliptic oblong, occasionally oblong lanceolate, apex abruptly short acuminate or sometimes abruptly caudate, base cuneate and more or less decurrent on petiole; up to 20 cm. long and 10 cm. broad; *primary nerves* up to about 15 pairs, 0·75–2 cm. distant, impressed above, prominent but not thick below, leaving midrib at an angle of 80–85 degrees and running nearly straight, or more usually curving gently up to the intramarginal nerve, which is 0·5–0·7 cm. from leaf margin, with a much fainter one c. 0·2 cm. from the margin; secondaries and reticulations faint above, easily visible below, usually a well defined secondary between each pair of primaries, reticulations rather lax; upper surface drying fuscous dull or greyish

brown, lower surface a warmer reddish brown; *petiole* stout, drying black, deeply channelled above, up to c. 1 cm. long.

Flowers usually solitary or occasionally in pairs at ends of branches, sessile; *calyx* in bud subglobose to obovoid, c. 2·5 cm. long and 1 cm. wide when mature, more or less campanulate after anthesis, slightly swollen about ovary, constricted at base into a short stout pseudostalk; surface of tube smooth or longitudinally striate when dry; lobes ?4, short, round, gland dotted, but the tube splitting deeply after anthesis into several deep irregular triangular false lobes. *Petals* ?4, free, thin, suborbicular with a short broad claw, c. 5–6 mm. diam., apparently often subpersistent, as are the calyx lobes, and adherent to the apices of the rolled back false calyx lobes. *Disc* lining calyx tube to c. 0·5 cm. above ovary. *Stamens* borne on the whole surface of the calyx tube above disc, the tube being produced c. 1 cm. above disc; filaments very numerous, slender, flattened below and gradually tapering upwards, c. 1·5 cm. long; bases of the fallen stamens giving the inner surface of the rolled back false calyx lobes a tesselate appearance; anthers oblong, c. 0·6–0·7 mm. long, connective gland inconspicuous; *style* c. 1 cm. long or a little longer. *Ovary* 2-celled with many ovules.

PERAK: Sungai Sah, Kledang Saiong, *Forest Dept. FMS 14721*, flowers in March, Malay name *Kelat Jambu;* Sungai Sah, Kinta, *Forest Dept. FMS 28055*, flowers in March, Malay name *Kelat.*

PAHANG: Bukit Goh Forest Reserve, Kuantan, *Forest Dept. FMS 3136*, TYPE collection, holotype in Herbarium of Forest Research Institute, Kepong, flowers in March, Malay name *Kelat Kuning;* Baloh, Kuantan, *Forest Dept. FMS 3719*, flowers in April, Malay name *Kelat Jambu;* Gunong Rokam, Pulau Tioman, 2,500 ft., *SFN 18779* (*Nur*), flowers in May.

A fruiting specimen without flowers has been collected at Sungai Paka, Trengganu, *Forest Dept. FMS 26723*. There is little doubt that it belongs to this species, but the fruits are in poor condition and have not been included in the description of the species. A note upon them follows:

The larger of the two fruits on the sheet is in a rotten and fragmentary condition. Its diameter may have been c. 2·5–3 cm., surface smooth and shining, apex with the remains of the calyx tube and the recurved calyx lobes, forming a crown c. 1·5 cm. diam. The other fruit is much smaller, c. 1·5 cm. diam., oblong globose with a truncate apex completely occupied by the calyx remains.

A collection made at Ulu Brang, Trengganu, c. 800 ft. alt., *SFN 33750* (*Moysey & Kiah*) possibly belongs here, but only immature fruits are available.

Eugenia (§ Fissicalyx) **Watsoniana** sp. nov. Fig. 18.

Arbor ad c. 10 m. alta. *Ramuli* teretes. *Folia* coriacea, anguste elliptica ad oblongo-elliptica, basi cuneata, apice abrupte breveque acuminata vel breve acuta, ad c. 20 cm. longa et 8 cm. lata, *petiolis* c. 1–1·5 cm. longis; *nervis primariis* utrinque 18–25, 0·75–1·5 cm. distantibus, supra impressis, subtus prominulis, in venam intramarginalem 2–3 mm. e margine conjunctis; nervis secundariis supra obscuris, subtus inconspicuis. *Flos* ?solitarius, terminalis, sessilis. *Calycis* tubus campanulatus, deorsum in stipitem

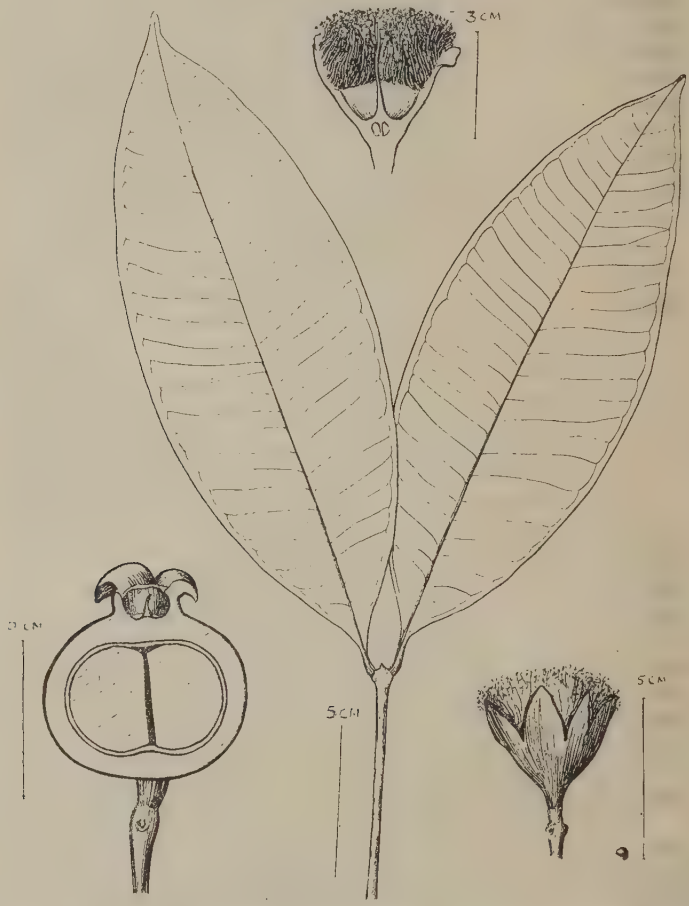

Fig. 18. **Eugenia Watsoniana** HENDERSON Del: CHAN YORK CHYE

brevissimem crassam attenuatus, c. 4 cm. longus et 3 cm. latus, lobis 4, rotundatis; post anthesin tubo calycis in 6–7 lobos irregulares longitudinaliter fisso. *Petala* ignota. *Stamina* numerosissima, e tubo calycis supra discum orta, filamentis 1·5–2 cm. longis. *Stylus* c. 3 cm. longus. *Ovarium* subtus 2-loculare, supra 4-loculare, multiovulatum. *Fructus* globosus vel depresso-globosus, 5–6 cm. diam., margine et lobis crassis reflexis calycis coronatus.

A *tree* up to c. 10 metres tall. *Twigs* terete with pale bark, almost white or greyish white, smooth or slightly flaky. *Leaves* more or less coriaceous, narrowly elliptic to oblong elliptic, base narrowed, apex very abruptly and shortly acuminate or shortly acute, up to c. 20 cm. long and 8 cm. broad, petiole rather stout, usually definitely channelled above, c. 1–1·5 cm. long, the lamina occasionally somewhat decurrent upon it; *primary nerves* 18–25 pairs, 0·75–1·5 cm. apart, more or less impressed above, prominent below but not thick, nearly straight or curving gently up to a well marked intramarginal nerve usually 2–3 mm. from leaf margin; secondaries and reticulations usually almost invisible above, not conspicuous below; upper surface drying dull greyish or fuscous brown, lower surface reddish brown.

Flowers apparently solitary and terminal, sessile, large; *calyx* more or less campanulate, shortly narrowed at base to a very short stout pseudostalk, texture thick and leathery, smooth or faintly longitudinally ribbed, c. 4 cm. long and 3 cm. across in bud, lobes 4, short, broad and rounded, the calyx tube after anthesis splitting into 6 or 7 rather irregular lobes 1–1·5 cm. long; *petals* not seen, probably falling very early; *stamens* very numerous, borne on the surface of the calyx tube above the disc, filaments very slender, c. 1·5–2 cm. long, anthers oblong, c. 0·7 mm. long, connective gland inconspicuous; *style* stouter than filaments, c. 3 cm. long; *ovary* 2-celled below, 4 celled above, multiovulate.

Fruit globose or depressed globose, 5–6 cm. diam., smooth or very faintly vertically ribbed when dry, crowned by the massive remains of the calyx tube 6–9 mm. tall and c. 2 cm. diam., along with the recurved false calyx lobes; pericarp hard and woody when dry, 5–7 mm. thick, testa nearly 1 mm. thick; cotyledons nearly equal, probably sessile, their inner faces apparently almost plane or slightly concave, attached to the hypocotyle near their centres.

SELANGOR: Sungai Lallang Forest Reserve, 1,000 ft., *Forest Dept. FMS 22928*, TYPE collection, holotype in Herbarium of Forest Research Institute, Kepong; "A small straggling tree, 15 ft., in damp stream valley, flr. yellow"; flowers in March; Kanching Forest Reserve,

Forest Dept. FMS 9563, flowers in February, *Forest Dept. FMS 5795*, fruit in January; Rantau Panjang Forest Reserve, *Forest Dept. FMS 595*, fruit in August.

A new section has had to be created for this and the preceding species. The longitudinal splitting of the calyx after the flower opens has not, so far as I can discover, been described in *Eugenia*, nor has the much more peculiar character, that of the stamens borne on the calyx tube above the disc, been found in *Eugenia*, or indeed in any other genus of Myrtaceae.

These two species are obviously very closely allied, but in *E. Symingtoniana* the stamens are borne over a wider area of the calyx tube than in *E. Watsoniana*, the flowers are smaller, and the leaves have fewer primary nerves, with the intramarginal nerve further from the leaf margin.

PUBLICATIONS OF THE BOTANIC GARDENS, SINGAPORE

1. **The Agricultural Bulletin of the Malay Peninsula** (Old Series) nos. 1–9, 1891–1900 (out of print).

2. **The Agricultural Bulletin of the Straits and F.M.S.** (Second Series, monthly issues) Vols. 1–10, 1901–1911. Most numbers are available, price 50 cents each or $5 per volume.

3. **The Gardens Bulletin, Straits Settlements.**

   Vol. 1 nos. 1–5, January to May 1912 (as *Agricultural Bulletin of the Straits and F.M.S., Third Series*). nos. 6–12, December 1913—March 1917 (as *The Gardens Bulletin, S.S.*).

   Vol. 2 nos. 1–12, July 1918—August 1921.

   Vol. 3 nos. 1–12, August 1923—March 1925.

   Vol. 4 nos. 1–12, June 1926—January 1929.

   Vol. 5 nos. 1–12, August 1929—June 1932.

   Vol. 6 nos. 1–15, (issued as parts 1–3) December 1929—October 1930.

   Vol. 7 parts 1–3, September 1932—June 1934.

   Vol. 8 parts 1–4, October 1934—October 1935.

   Vol. 9 parts 1–4, December 1935—March 1938.

   Vol. 10 parts 1 and 2, January 1939—August, 1939.

   Vol. 11 parts 1–3, May 1939—August 1941.

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